TECHNOLOGY DEPARTMENT

32nd Year NOVEMBER, 1948

RUBBER AGE

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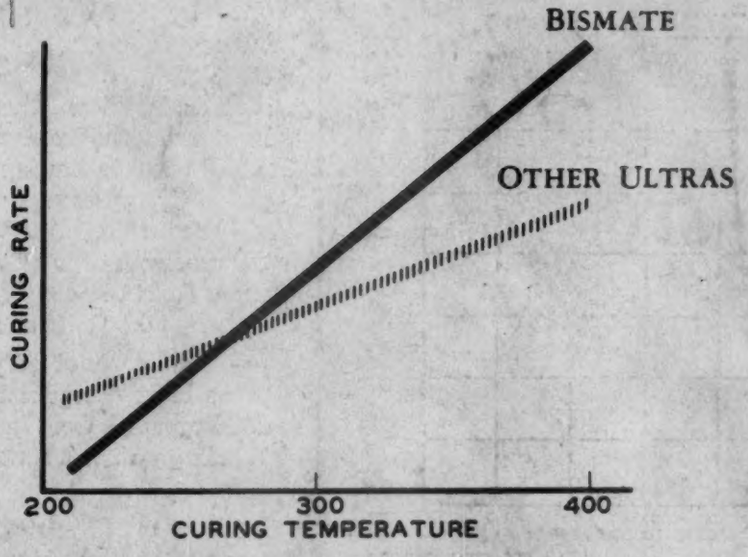
DETROIT

BISMATE
... A New Ultra-Accelerator



An extremely fast accelerator at high temperatures and relatively safe processing at mixing temperatures.

IN RODFORM OF COURSE

R. T. VANDERBILT CO. INC.

230 Park Avenue, New York 17, N. Y.

Tests show

Du Pont POLYAC

gives fast curing neoprene latex films

TEST RECIPE

NEOPRENE from Type 571 Latex	100.0
ZINC OXIDE	5.0
NEOZONE D	2.0
CLAY	10.0
AQUAREX SMO	1.5
SUNAPTIC ACID	1.0
POLYAC	As Indicated

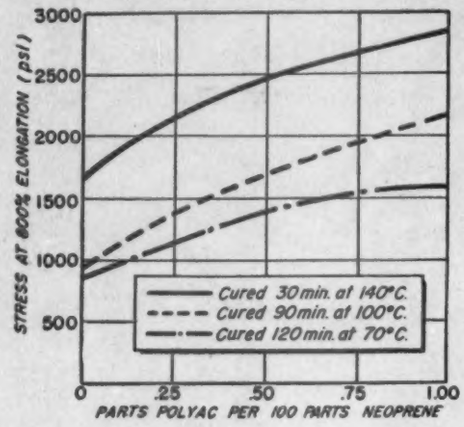


Figure 1

TEST RECIPE

Compound	A	B	C
NEOPRENE from Type 571 Latex	100.0	100.0	100.0
ZINC OXIDE	5.0	5.0	5.0
NEOZONE D	2.0	2.0	2.0
AQUAREX SMO	1.5	1.5	1.5
SUNAPTIC ACID	1.0	1.0	1.0
POLYAC	—	2.0	2.0
2-MT	—	—	1.0

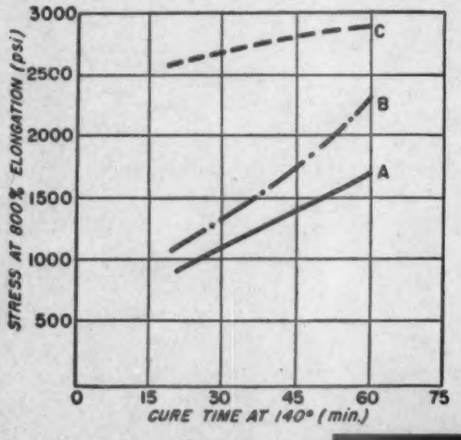


Figure 2

Where fast cures are needed, and where films must have high tensile strength, low permanent set and low water absorption, Polyac is an especially effective accelerator for neoprene latex.

Figure 1 shows how varying amounts of Polyac affect the rate of cure of a neoprene latex compound as indicated by 800% modulus. Note that Polyac increased the curing rate at *all* temperatures . . . *even as low as 70° C.* And the films cured with Polyac proved to have higher tensile strength, lower permanent set and lower water absorption.

For even faster cures, Polyac may be used in combination with conventional rubber accelerators such as Tepidone, Zenite, 2-MT or Thiuram M. In Figure 2, the increased curing speed of Polyac—2-MT acceleration is shown. Observe that Compound C, containing both Polyac and 2-MT, has a higher modulus after 20 minutes cure, than either Compound A or B after 60 minutes. *In fact, it was found that Compound C cured as rapidly at 100° C. as Compound A did at 140° C.*

For a sample of Polyac for testing in your neoprene latex compounds, write to: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Div., Wilmington 98, Delaware.

Tune in to Du Pont "Cavalcade of America," Monday Nights—NBC Coast to Coast

POLYAC *is also valuable as an activator in butyl inner-tube stocks because it increases modulus and hot tear resistance and decreases permanent set. In uncured butyl compounds, Polyac is an effective stiffener, thereby minimizing splice defects.*

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E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT

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BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. November, 1948. Vol. 64, No. 2.

TWO NEW PLASTICIZERS FOR VINYL RESINS

New Hycar Nitrile Polymers make processing easier and widen fields for makers of many products

THIS news is important to any company dealing in any way with the vinyl resins. The new Hycar EP (easy processing) and Hycar NS (easy-processing, non-staining) offer exceptional advantages. These are nitrile rubbers that really *blend* with the vinyls. Check these properties:

★ **PERMANENT CEMENTABILITY**—because these plasticizers are non-migrating and non-volatile. (Of vital interest to any manufacturer of products requiring cemented construction.)

★ **STABILITY**—won't get brittle, won't evaporate.

★ **NON-MIGRATING**—won't soften or pick up varnish.

★ **EASY PROCESSING**—and a more perfect blend either on a mill or in a Banbury. Calenders and extrudes *smoothly*.

★ **HIGHER LOADING**—economy in products where the price per pound of the compound is important.

★ **WIDER LATITUDE**—in color and color stability, particularly with those hard-to-do pastels.

Our service bulletin, 48-H1, on the use of the new Hycar American Rubber with the vinyl resins, will be sent on request. We make no finished products from Hycar or any of our other raw materials, but we are glad to help in the development work on any special applications. Write Dept. HB-11, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Hycar
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American Rubber

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Phillips 66

Rubber Chemicals Division

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Upholstery material is Boltaflex, made by The Bolta Co., New York

. . . demonstrates many of the qualities produced by Geon polyvinyl resins

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We make no finished products from Geon or any of our other raw materials. However, we are always glad to supply information and to assist in any special problems. Write B. F. Goodrich Chemical Company, Dept. R-11, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

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scorched stocks
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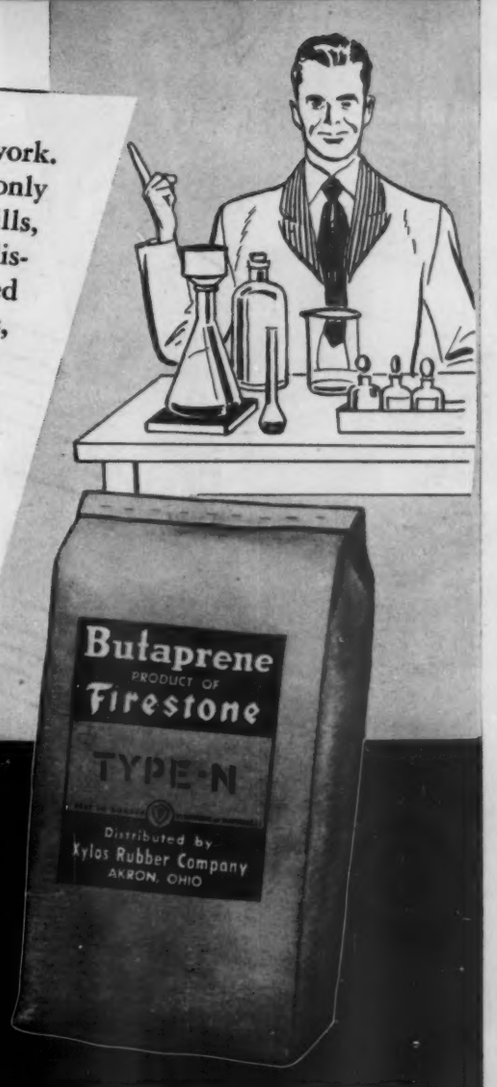

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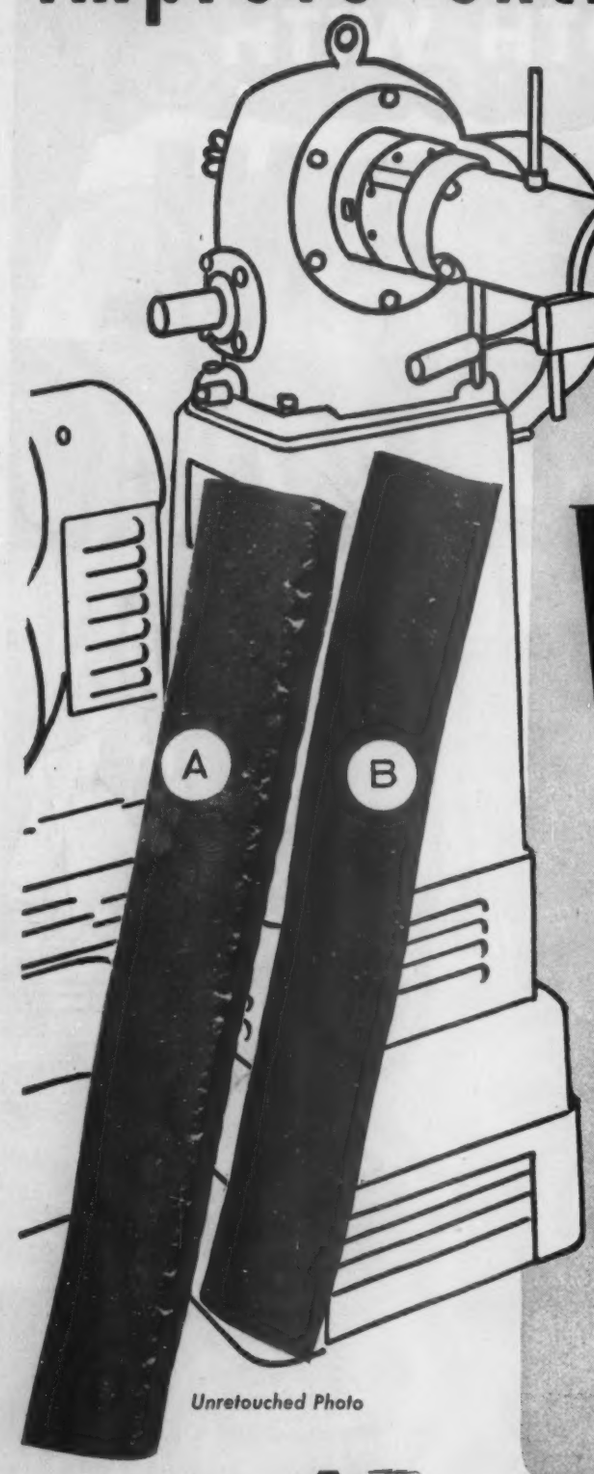

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Increase Processing Capacity *with* *Plasticizer*

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You can depend on Vistac #1 to promote smoother extrusions. In illustration at left, note the graphic difference in the quality of extrusion between Compound A (plasticized with 10% petroleum type softener) and Compound B (plasticized with 10% Vistac). The pictures give visual proof of the effectiveness of Vistac #1.

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- Does not discolor white or light-colored stocks
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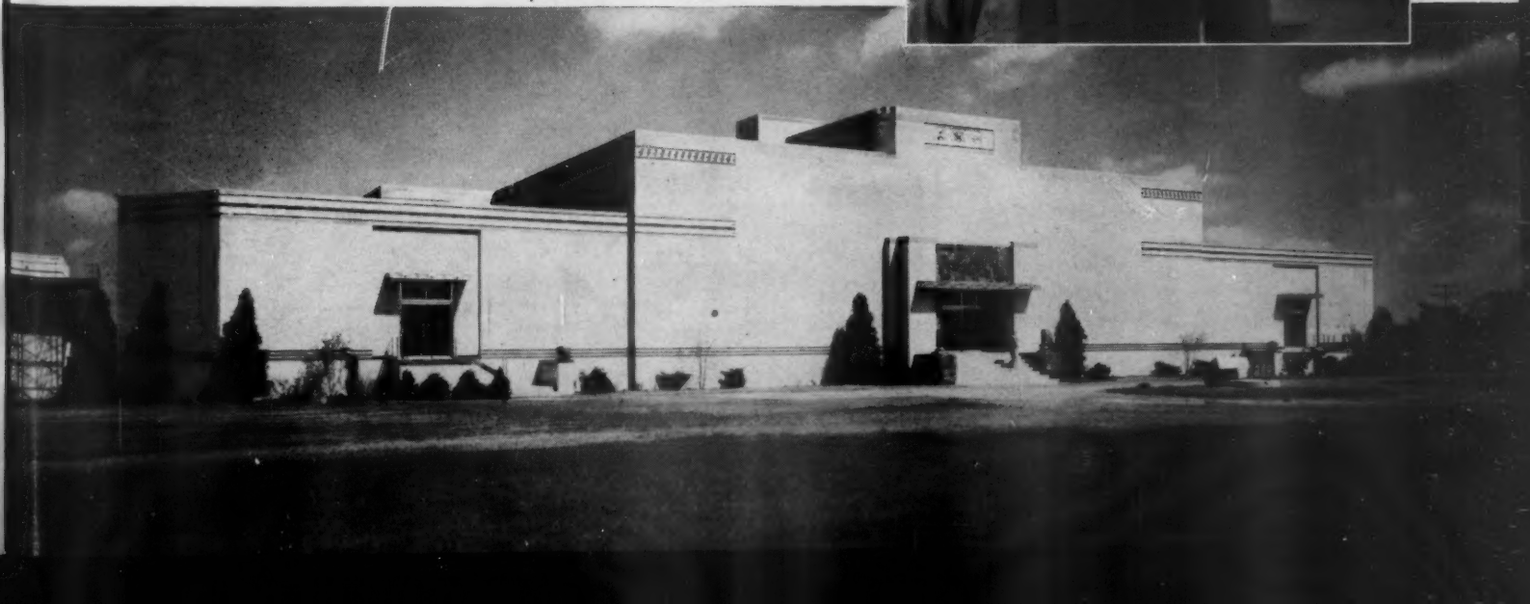

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IMPROVE WEAR . . . by improving abrasion resistance.
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IMPROVE CHEMICAL AND WEATHER RESISTANCE.
PRODUCE GLOSSY FINISH.

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RUBBER AND PLASTICS MACHINERY DIVISION

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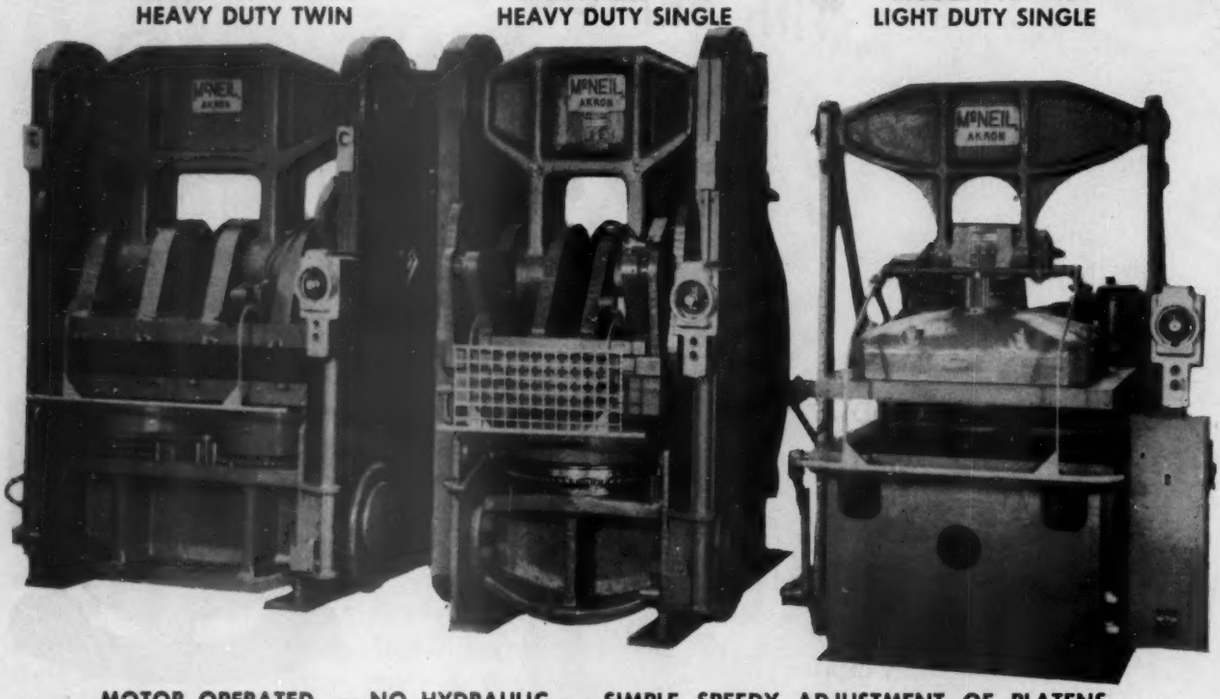

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- Two 24" x 24" molds may be used in same or different thicknesses or one 24" x 48" mold

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- 32" x 32" drilled steam platens
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- Range of mold thickness, 1" minimum to 5" maximum or 2" minimum to 6" maximum

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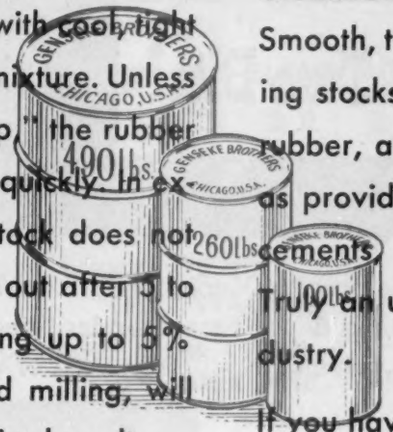
FOR NATURAL AND SYNTHETIC RUBBERS

SYNTHOL is an unexcelled material for "bringing back" both scorched natural rubber stocks and synthetic rubber compounds. The process is not only simple and quick, but very effective. In most applications, 1 to 2% of SYNTHOL added to the batch plus milling with cool, tight rolls, results in a smooth mixture. Unless badly scorched or "set-up," the rubber usually comes back very quickly. In extreme cases, when the stock does not break down and smooth out after 5 to 10 minutes milling, adding up to 5% SYNTHOL, with continued milling, will generally bring about desired results.



Even ground cured scrap, if not too dry, can be plasticized with SYNTHOL—5 to 8%—and remolded for practical use in many mechanical articles.

SYNTHOL is an outstanding tackifier and plasticizer. Through its use, milling costs are reduced by speeding up the breakdown and dispersion of pigments. Smooth, tacky, nerveless, easy processing stocks result. For vulcanizing scrap rubber, and for smoothing out as well as providing additional tack in rubber cements, SYNTHOL is very effective. Truly an unusual aid for the rubber industry.

If you have a problem where you think SYNTHOL can be used advantageously, tell us about it. Specific information will be sent you promptly.

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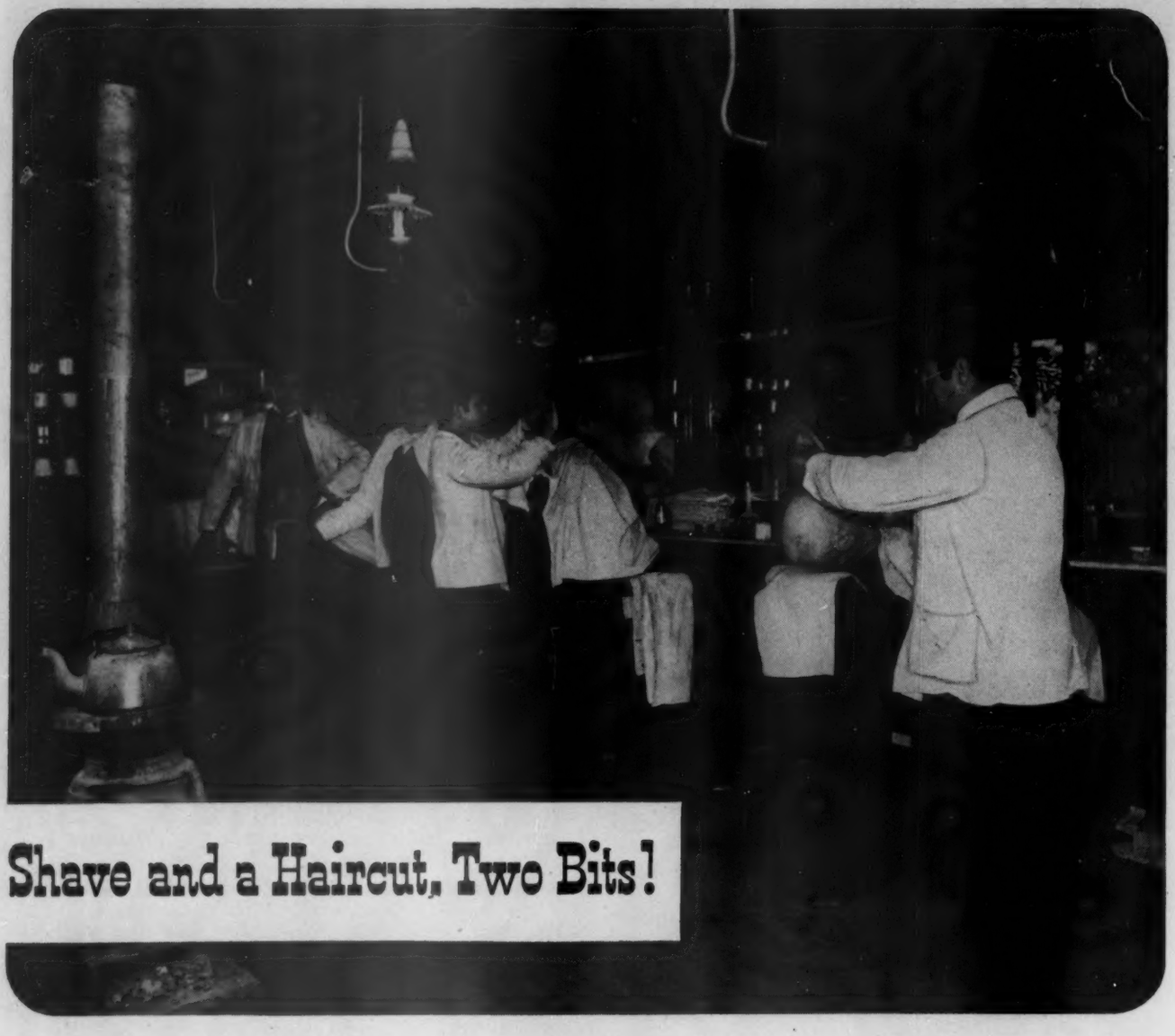

Shave and a Haircut, Two Bits!

The price of a haircut has gone up a lot since the nineties, and that's not all that has changed. Back in those "good old days" Esso Standard had just begun to study and experiment with light fraction petroleum refining... out of which came Esso Solvents.

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is today used in the manufacture of razors, razor blades, and other rust-resistant metal products. Esso Solvents also play a role in many other industries ... from automobiles to textiles, from rubber to wood preservatives ... wherever uniform high quality and stability is required.

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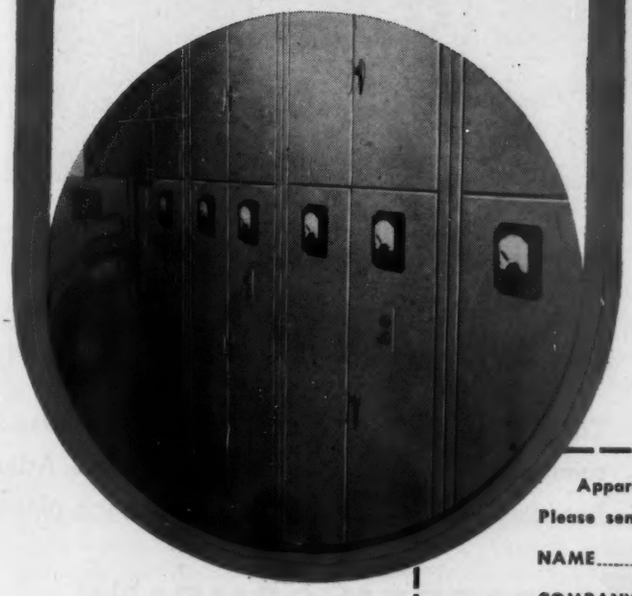
Two beaters, each powered by a 400-horsepower G-E synchronous motor, start the production of 50 tons of paper a day at The Chase Bag Company

protected...
BY LIMITAMP



1900 horsepower's worth of paper production

At the Chase Bag Company's Chagrin Falls mill, two beaters, two Jordans, and a Fourdrinier paper machine are powered by G-E synchronous motors and a 10-unit m-g set controlled and protected by five G-E Limitamp controllers. These machines produce 50 tons of paper a day, and loss of a day's production cannot be recovered in a month or even a year if a breakdown occurs. It's important to prevent electrical disturbances resulting from short circuits—and that's where G-E Limitamp proves its worth.

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Please send me your publication GEA-4247 describing the Limitamp controller.

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Fig. 1—15-ft. diameter by 45-ft. long horizontal vulcanizer with quick-opening door for vulcanizing rubber linings in large storage tanks. *Fig. 2*—Biggs vulcanizer with special heating manifolds and circulating fan; all sizes, various working pressures.

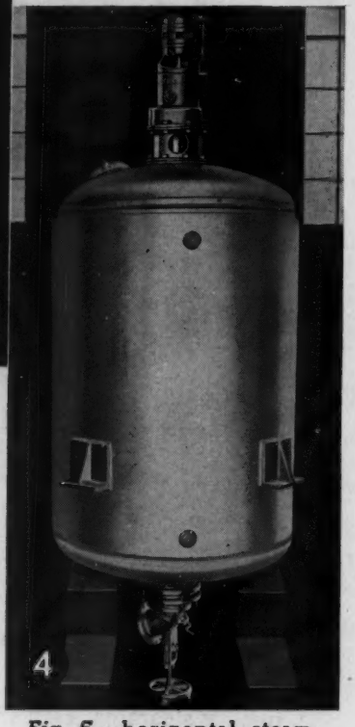
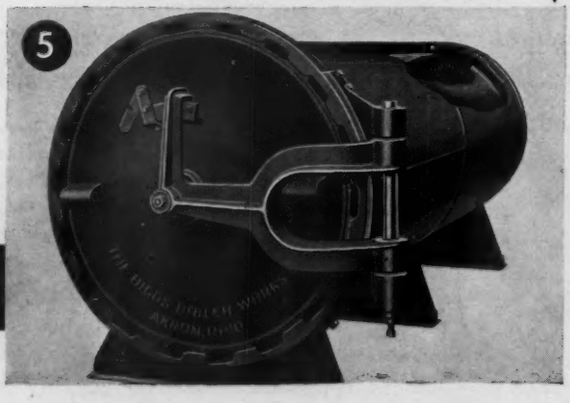


Fig. 3—vertical vulcanizer with quick-opening door. Door is handled by self-contained arm and gear-operating mechanism. Hand or motor operation.

Fig. 4—high pressure heavy duty jacketed vertical devulcanizer with special agitator. Furnished in various sizes.

Fig. 5—horizontal steam-jacketed vulcanizer with hinge type quick-opening door; all sizes, for various working pressures. Welded construction throughout.

BIGGS-built vulcanizers and devulcanizers have occupied a prominent place in the development of the rubber industry since its inception. For more than 45 years Biggs has furnished single-shell and jacketed vulcanizers both vertical and horizontal, as well as many different types of devulcanizers to meet various requirements of the reclaim experts. . . . It is a far cry from the old days of bolted doors and riveted construction to Biggs modern all-welded units with quick-opening doors. Biggs vulcanizers and devulcanizers are available in all sizes and for various working pressures — with numerous special features. *Write now for our Bulletin 45.*



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1. Methocel is compatible to an unusual degree with a wide variety of modifying agents including alcohols, wetting agents, plasticizers and resins.
2. Methocel is odorless, harmless.
3. Methocel solutions ordinarily do not require preservatives.
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The success "secret" in all three of these cases is *planned processing flow.*

Developed from start to finish by Farrel-Birmingham engineers, each of these layouts is composed of production machines *matched in capacity* to prevent the "choking" or "starving" of succeeding units. Production flows without costly interruptions and with manual aid and supervision reduced to a minimum.

The Farrel-Birmingham *Engineering Planning Division* is staffed by men with a background of many years of experience in solving processing problems for the rubber and plastics industries. These men will be glad to discuss the possibility of improving your production efficiency and cutting your handling costs through *planned processing flow.*

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FB-483

PLASTIC FILM

Originally developed for one producer of plastic film, this setup has since been generally accepted as the standard production unit for plastic film and coatings. Matched production unit consists of a 3A Banbury, 22" x 60" mill and 24" x 66" calender. The size and design of the Banbury and mill assure an even flow of properly conditioned material to the calender. The approximate 1200 pounds per hour capacity of the Banbury gives full time operation, without overload, to the mill. The calender is in ideal balance with the other two machines.

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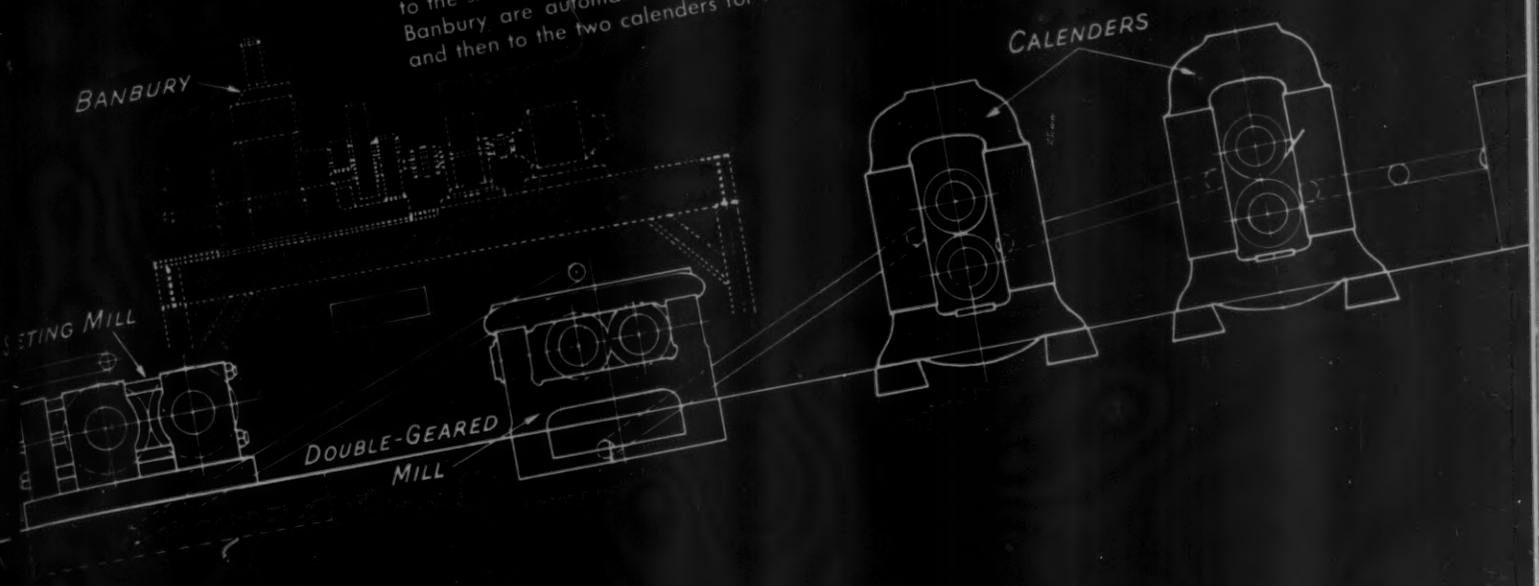
Farrel-Birmingham

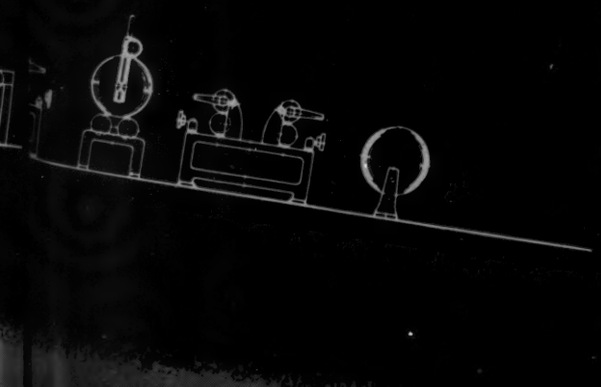
FLOORING

Schematic layout developed to synchronize production through the progressive steps in the manufacture of asphalt tile. The two Banburys discharge mixed stock onto a conveyor which carries it to the sheeting mill. The sheet and the mottle chips from the third Banbury are automatically conveyed to the double-geared mill and then to the two calenders for reduction to final gauge.



PHONOGRAPH RECORDS

Setup especially designed for the production of blanks from which phonograph records are made. In operation the 12" extruder receives stock directly after it has been processed in a Banbury mixer. The extruder, which requires no operator, handles the full capacity of the Banbury. The stock is thoroughly worked by screw action under close temperature control, and the die head extrudes a strip which is conveyed to the calender and blanking unit.



F-B PRODUCTION UNITS

Banbury Mixers ● Plasticators ● Pelletizers ● Mixing, Grinding, Warming and Sheeting Mills ● Bale Cutters Tubing Machines ● Refiners ● Crackers ● Washers Calenders ● Hose Machines ● Hydraulic Presses ● and other equipment for processing rubber and plastic materials.

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13-10—HOSE COMPOUNDS

13-3—NEOPRENE COMPOUNDS

13-12—LOW HARDNESS MECHANICAL GOODS

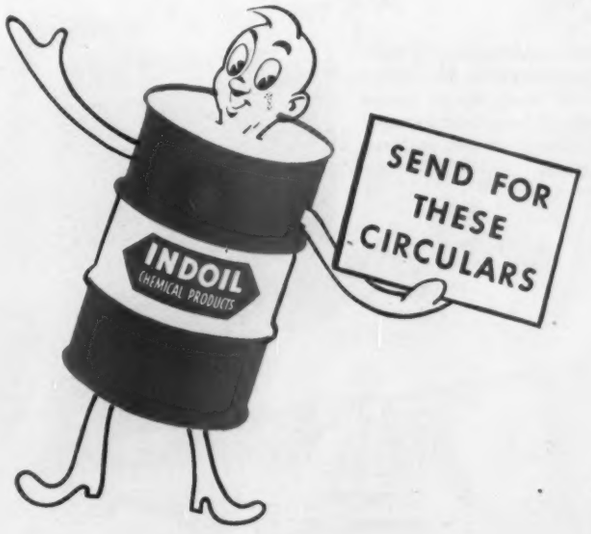
13-20—SELECTION OF INDONEX-ACCELERATOR COMBINATIONS

13-22—NATURAL RUBBER OF VARIOUS QUALITIES

13-1—BUTYL RUBBER COMPOUNDS

13-6—CAMEL BACK

13-13—NEOPRENE MECHANICAL GOODS



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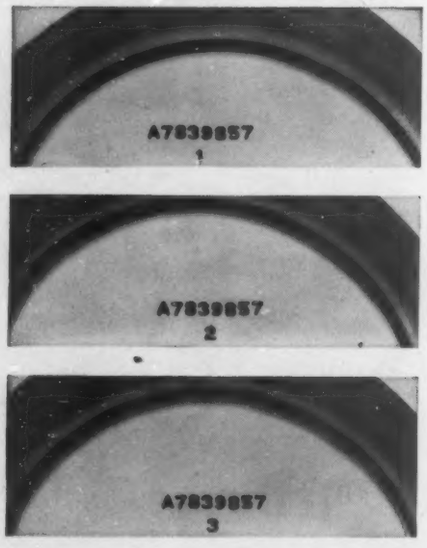

National-Standard fluoroscope provides for either visual study or, as shown here, a photographic record of a complete tire in three sections.

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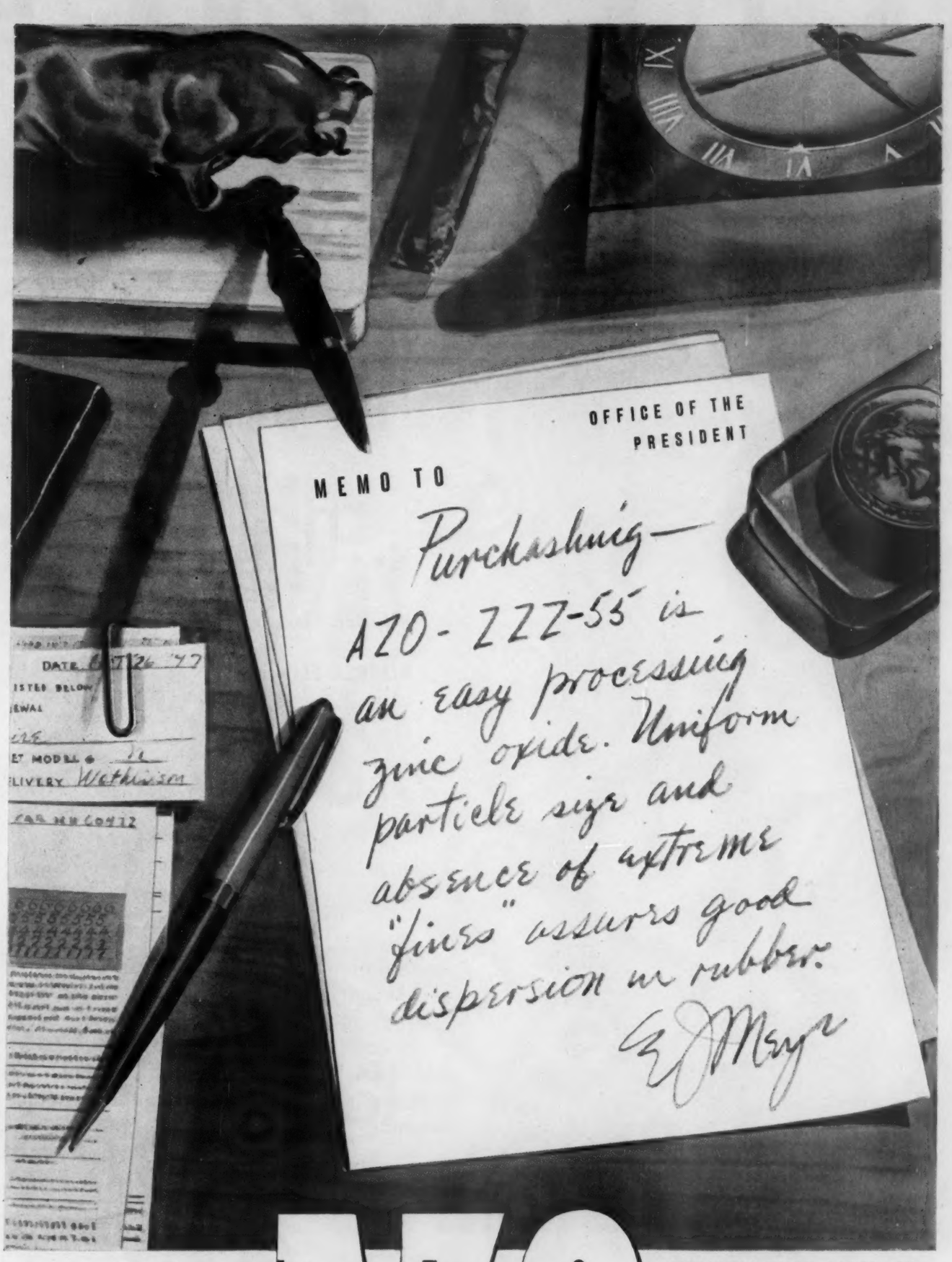
WORCESTER WIRE WORKS	*Worcester, Mass.*	Round Steel Wire, Small Sizes



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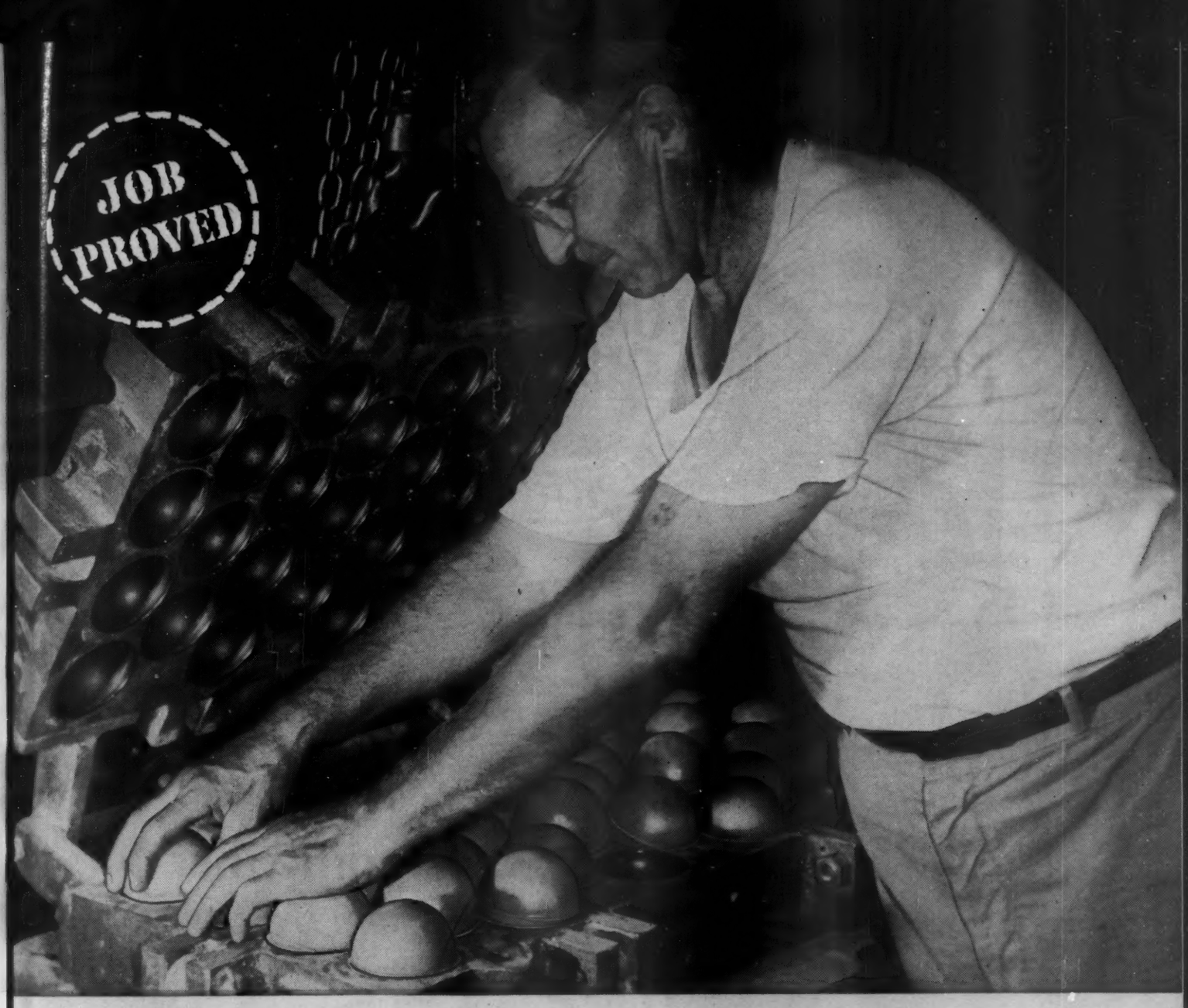

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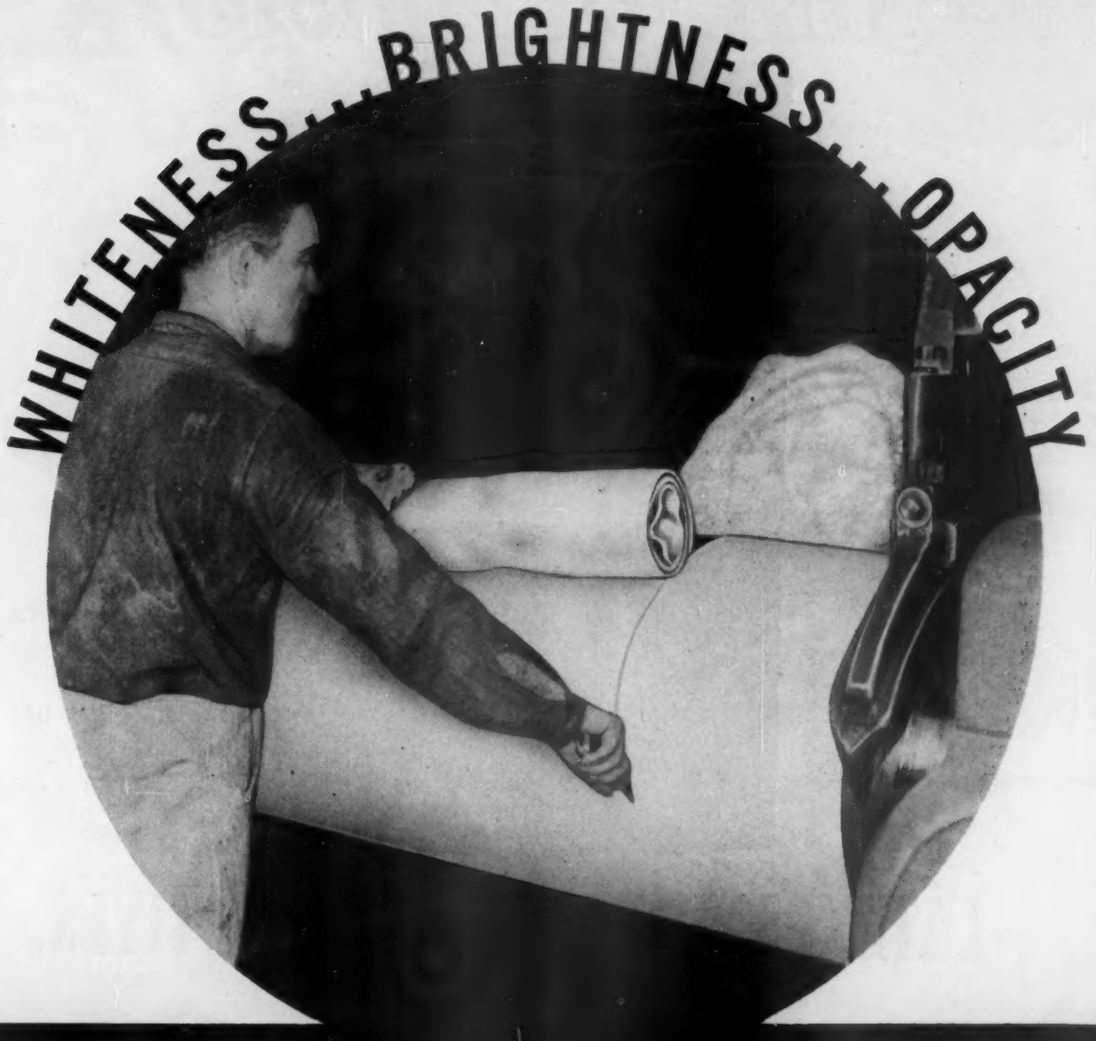

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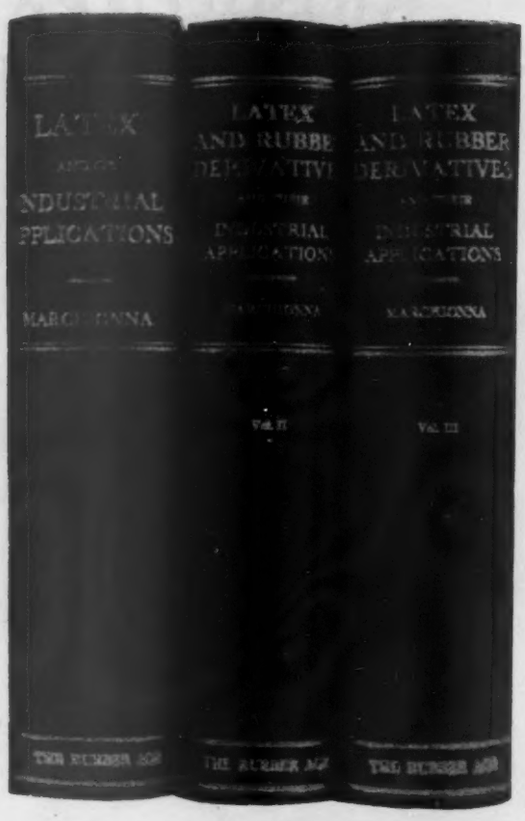

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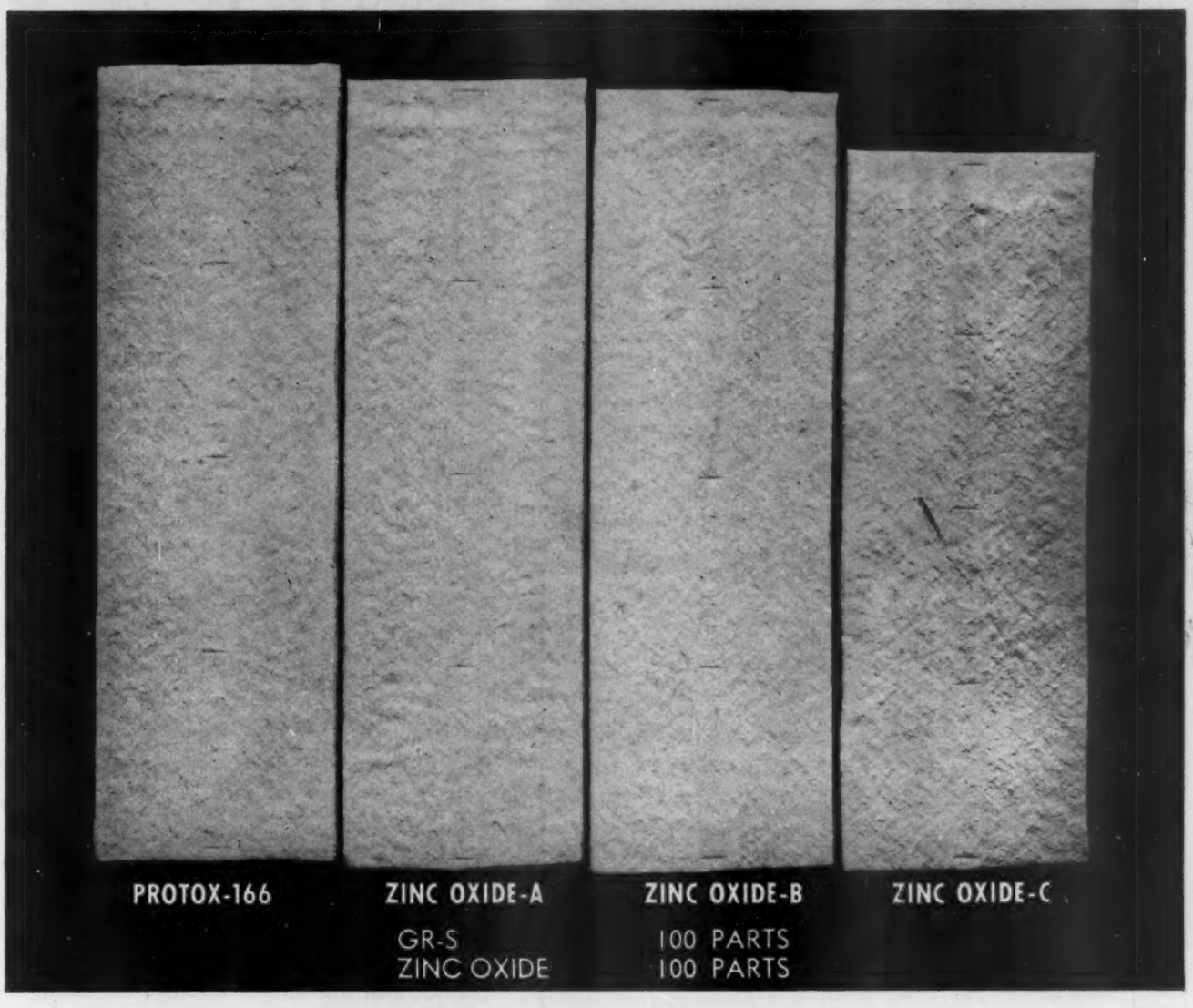

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Vol. 64, No. 2 NOVEMBER, 1948

Some Factors Affecting the Continuous Polymerization of GR-S

By D. H. FRANCIS and H. R. SONTAG

Goodyear Synthetic Rubber Corp., Houston, Texas

IN the initial process used for production of GR-S in plants constructed under the Government Synthetic Rubber Program, the polymerization of GR-S was accomplished by batchwise operation. Most of the other operations for the production of GR-S in these plants were essentially continuous.

Because of the critical shortage of rubber in 1943 and the expected demand for quantities of GR-S, even greater than the batchwise capacity of the copolymer plants, ways and means of increasing capacity were investigated. One way of increasing production was by continuous polymerization, since the polymerization process was the limiting production factor.

Early in 1942 a pilot plant continuous polymerization project using small reactors similar to those installed in the copolymer plants had shown the feasibility of continuous operation. Accordingly, it was decided to convert six batch polymerizers into a continuous unit in the Goodyear-operated Houston plant.

After the successful operation of this unit in the spring of 1944, twelve reactors were converted for continuous operation in the fall of 1944. Later the number of reactors in a series was increased to 24, thereby increasing the potential output of the unit operated by one set of charging equipment to 3,000 to 3,600 long tons of GR-S per month, depending upon the temperature of polymerization—117° F. to 121° F.

Since the first plant scale unit for producing GR-S continuously was installed four years ago, a considerable amount of experience has been gained in the use of different types of control equipment for the process. It is the purpose of this paper to describe some of the equipment that has been used in controlling this operation and to relate some of the more important factors affecting the continuous polymerization of GR-S.

Note: This paper was presented at the Symposium on Chemical Engineering Developments in the Synthetic Rubber Program held by the American Institute of Chemical Engineers at Cleveland, Ohio, May 10, 1948.

Equipment

Charging: The heart of the continuous polymerization system is the equipment controlling charge rates, since the uniformity of the polymer produced is largely determined by the accuracy of charging. The original plant scale continuous unit utilized reciprocating proportioning pumps (Figure 1). These pumps are operated in parallel by one variable speed drive, and each pump in the series is sized for the normal flow of its respective material.

The variable speed drive may be used to change pro-

FIG. 1—Reciprocating proportioning pumps used for continuous GR-S polymerization charging.

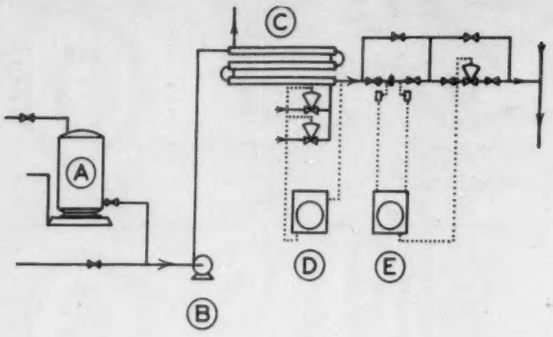

FIG. 3—Diagram of typical orifice meter installation for controlling continuous polymerization charging. (A) Calibration weigh tank, (B) Pump, (C) Exchanger, (D) Temperature controller on charge stream, (E) Orifice meter.

duction rates while maintaining a constant ratio of charge materials. The micro screw adjusting arm on each pump permits adjustment of individual charge flows. The accuracy of proportioning pumps is satisfactory; and aside from the massiveness of this type of equipment, the chief objection is the pulsating flow resulting from its use.

To overcome problems created by the pulsating flow resulting from the use of reciprocating pumps, and to provide a continuous record of flow, centrifugal or turbine pumps with flow controllers are used. In this system the material to be metered is pumped to a pressure exceeding the reactor pressure and then is passed through the flow controller and control valve.

One system of flow control equipment utilizes rotamatic controllers of which two types have been used. The Magnabond type embodies the principle that the control mechanism follows by magnetic attraction the float in the rotameter. This was the first type used on the twelve-reactor continuous line in the Houston plant. The induction type instrument (Figure 2), embodies the principle of an electric induction bridge system, the float armature moving inside two induction coils and balancing against a similar armature and coils in a remote instrument case. Since the instrument may be remotely located from the primary measuring element,

FIG. 2 — Rotamatic flow controllers employing induction transmission to the instruments recording charge flows.

this type is used in many installations. In both types of volumetric controllers, a pneumatic controlling mechanism containing proportional response and automatic reset operates the control valve. By proper sizing of the float and the bore of the tapered tube, good accuracy of flow measurement may be obtained.

Another system of flow measurement utilizes orifice meters (Figure 3). Since the material measured must be kept out of the meter body, seal pots are used. For butadiene and styrene, water is used as a sealing fluid as these materials have a density below unity and are immiscible with water. Carbon tetrachloride is used for sealing the soap-catalyst material. Orifice sizes were determined by Bernoulli's theorem with corrections applied for the specific gravity of the sealing fluids. Orifices are so located as to prevent swirling or helical flow in the upstream channel. They will control accurately if the orifices are sized so that the control point is in the upper range on the square root scale. The simplicity and resultant low maintenance cost on orifice meters are their primary advantage over other types used.

Orifice meters and rotameters both indicate the correlation between differential pressure across a restriction and the rate of flow through the restriction. In the former the restriction is constant, and in the latter the differential pressure is constant. The weight rate of flow through orifice meters, rotameters, and metering pumps is a linear function of the density of the fluid. Therefore, the error in charging introduced by temperature variation is the same regardless of which of the three types of metering equipment is used.

The equipment previously described was for the measurement of butadiene, styrene, soap-catalyst solution, and shortstopper solution. In comparison, the flow of chain modifier is very small and presents a different problem in measurement. The amount of this material

TABLE I—COMPARATIVE PERFORMANCE OF RECIPROCATING PUMP AND ROTAMATIC CONTROLLER IN CONTROLLING MODIFIER CHARGE

Type	Desired Rate (lb./hr.)	Average Rate (lb./hr.)	Standard Deviation (lb./hr.)
Reciprocating Pump	24.00	23.87	0.56
Rotamatic Controller	24.00	23.72	0.70

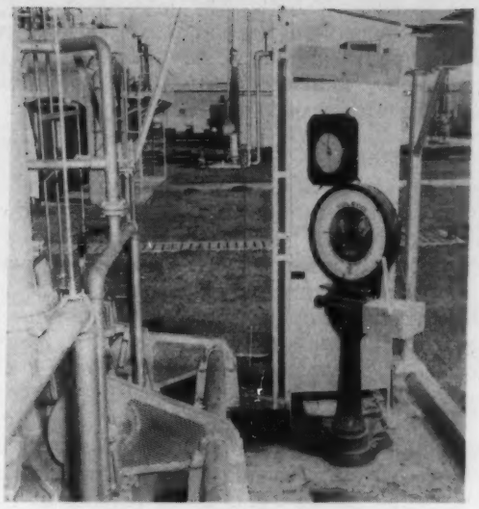

FIG. 4—Continuous recording weigh scale supplying modifier charge pump.

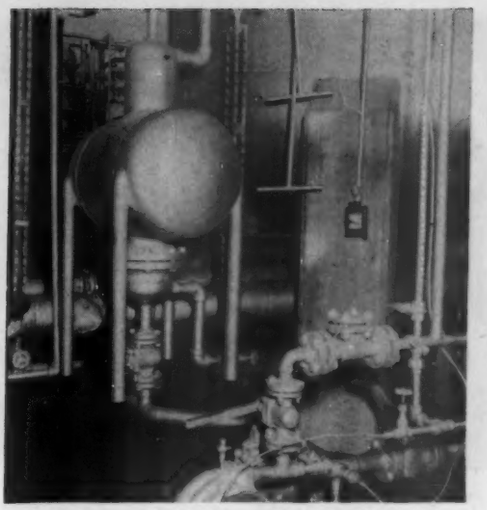

FIG. 5—Typical flow calibration tank.

charged largely determines finished polymer properties, and therefore, its measurement is very important.

Since a continuous record of flow and immediate indications of flow changes are desired, an induction type rotamatic controller has been tried for regulating modifier flow. Performance of the rotamatic controller as compared to a reciprocating proportioning pump is indicated in Table I. Although the average rate obtained with a rotamatic controller is comparable with that obtained from a proportioning pump, the standard deviation (amplitude of variation from the set point) is greater for the rotamatic controller.

In order to obtain a continuous record of modifier addition, when using a proportioning pump, weigh scale equipment with a recorder (Figure 4) has been used. Although changes in flow rates cannot be detected immediately, prolonged deviations in flow rate can be detected. This installation employing a reciprocating proportioning pump with a continuous record of the weight of material charged appears to be the most satisfactory of those investigated for chain modifier addition.

Calibration Tanks: The accuracy of the charging rate to a continuous polymerizer is largely dependent on the type of calibration used with the flow meters or pumps. Both volumetric tanks and weigh tanks have been used. Volumetric calibration tanks (Figure 5) are usually designed with restrictions on both ends for greater accuracy in reading. Since the temperature of materials affects volume, temperatures must be maintained within close limits. The design calibration time used in sizing these tanks is five minutes.

Weigh tanks have also been used in calibrating flow meters by checking the deviation in flow, as well as the rate of flow from increment readings over a short period. Temperature with this equipment is not critical.

Reactors: The reactors (Figure 6) used in the GR-S continuous process were those originally installed for batchwise operation. In the standard plant these are 3,750-gallon capacity, glass lined, 125 psi working pressure vessels equipped with Brumagim type agitation.

As originally installed in the plants, the agitators rotated at 235 rpm and had three blades pitched at 5° 21′. As a result of experimental work done in 1943, under the direction of the Copolymer Equipment Development Section of the Office of the Rubber Director, a modification to the agitation of the reactors on a batchwise basis resulted in considerably less chain modifier usage. On the basis of this work, the agitation in all of the standard plant reactors was changed to a 31.5-inch diameter, modified Brumagim type which rotates at 105 rpm. The revised agitators employed three blades with surface dimensions 5 inches by 13 inches and a pitch of 45°. This agitation was unchanged for continuous polymerization reactors.

The polymerization of butadiene and styrene requires the removal of the heat of reaction. Accordingly, the reaction vessels are jacketed and cooling water is recirculated by means of a centrifugal pump. Cold water is added to this circulating water system to maintain an in-

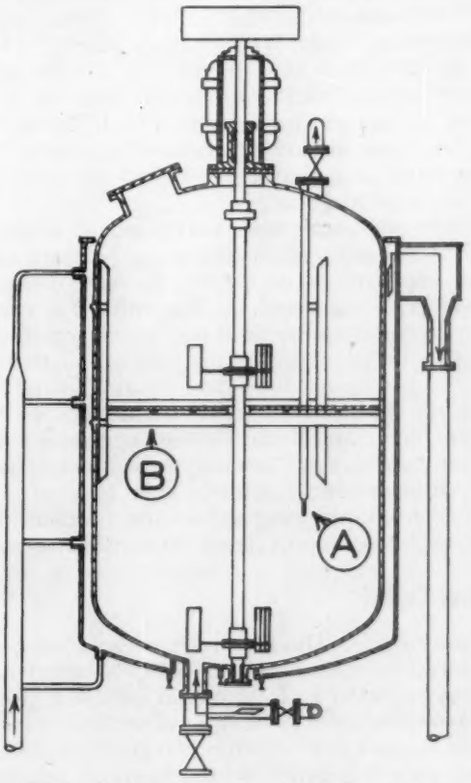

FIG. 6—Section of a typical reactor.

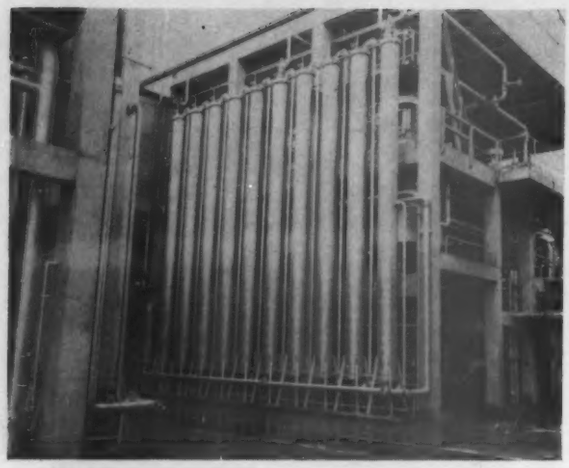

FIG. 7—Displacement reactors at the end of the reactor chain.

ternal temperature within ± 1° F. of the desired polymerization temperature. The control bulb is located in the bottom section of the vessel. Agitation of the reactor contents reduces heat transfer resistance at the internal reactor wall, thus also aiding in removal of the heat of reaction.

Initial plans called for continuous polymerization in twelve reactor chains. In order to reduce short-circuiting in the reactors, the number of reaction vessels was doubled simply by inserting a baffle with an annular opening around the agitator shaft in each reactor. In this way pipeline flow of the latex was more nearly attained without sacrificing volume and heat transfer characteristics.

Displacement Reactors: Displacement reactors (Figure 7) were installed as a result of Pilot Plant work in which it was shown that the use of a displacement tube without agitation improved product quality. These reactors are 18 inches in diameter and 30 feet in length. They are welded steel construction and are equipped with heat exchangers between each unit. Ten such units are used in each line of polymerizer vessels and in volume are equal to approximately 3,750 gallons, the capacity of one standard reactor.

Although plant-scale tests conducted on a continuous unit with and without displacement reactors failed to show an improvement in quality, the use of this equipment has been continued, as they afford a convenient means of controlling the shortstop viscosity within closer limits since the shortstopper may be added to any unit.

Discharge Valve: Pressure is maintained on the unit by a pressure controller operating a glass-lined Saunders type control valve located on the downstream side of the displacement reactors. This type of valve is found to be non-plugging and its use resulted in a continuous uniform flow of latex from the system.

Methods of Control

Charging Ratio: The flow rates of butadiene, styrene, soap-catalyst solution, and shortstop solution are controlled by meters, and the chain modifier flow by a charge pump or meter. The ratio of total pure monomers to water in the soap solution remains constant at 100 parts of pure monomers to 180 parts of water. Slight variations in the purity of the monomers and small changes in the polymerization ratio make necessary compensating adjustments in flow. The ratio of chain modifier to pure monomers is adjusted to produce the desired shortstop viscosity in the polymer at a specified conversion.

Control of Viscosity: The primary control of the continuous polymerization process is based on the shortstop viscosity which may be defined as the potential Mooney viscosity of the finished polymer. This property of the polymer is controlled by changing the addition point of the shortstopper solution to any one of the displacement reactors or by adjusting the temperature of the last six polymerizing vessels within ± 2° F. of the specified reaction temperature. Frequent sampling of the shortstopped latex and laboratory testing of the polymer obtained from it facilitates close control of the polymer viscosity by varying the point of stopper addition and/or by minor changes in polymerization temperature.

Control of Conversion: The hydrocarbon conversion may be defined as the percentage of pure monomers charged that have entered into the polymerization reaction. The ratio between the hydrocarbon conversion and the shortstop viscosity (Figure 8) is governed by the amount of chain modifier used. Variability in raw materials causes this ratio to change from time to time. Since the primary control is on the shortstop viscosity, the conversion will vary unless adjustments in the amount of modifier charged are made. One of the weaknesses of the continuous system is that the effect of the change in modifier charged does not show up in the finished product for approximately 18 hours, the length of retention, which results in variable hydrocarbon conversion. At the present time, work is being conducted by Mellon Institute and others for the prediction of shortstop viscosity and hydrocarbon conversion from continuously recorded data on latex taken from one of the first few polymerizers.

The work of several investigators has shown that increment addition of the modifier charge during the course of a batch polymerization produces a polymer of normal viscosity and conversion with a substantial saving in modifier. Short-circuiting in the continuous polymerization system achieves an effect similar to increment modifier addition with a resultant 23 percent re-

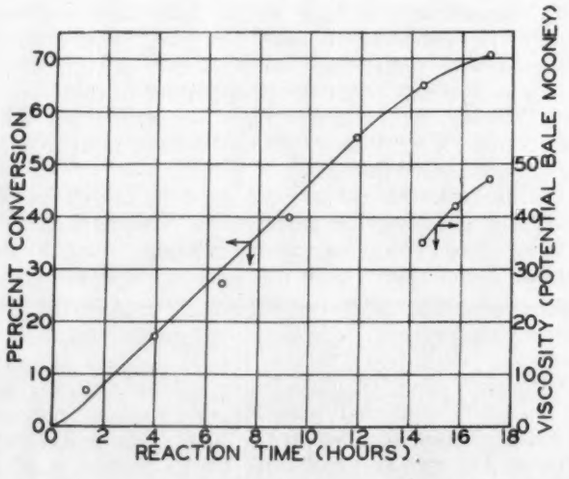

FIG. 8—Conversion of monomers to polymer, and increase in polymer viscosity, both correlated with reaction time.

TABLE II—EFFECT OF SOAPS ON MODIFIER REQUIREMENT

Soap Manufacturer	*Modifier Requirement*
A	.487
A′	.415
B	.415
C	.436

duction in modifier requirement below the requirements for batch polymerizations.

Chilled Shutdown: Occasionally it becomes necessary to suspend operations of the continuous system. For prolonged shutdowns, the polymerization of the materials in the reactors is completed batchwise. Under these conditions the hydrocarbon conversion may be expected to fall off, depending on the position of the polymerizer in the continuous chain unless additional chain modifier is added. If the shutdown can be anticipated, the modifier addition may be increased incrementwise until the requirement for batch polymerization is reached before charging is stopped. In this manner uniform hydrocarbon conversions may be maintained during shutdowns.

Since considerable time is lost in completely shutting down a continuous unit, the reaction may be retarded to the point that charging can be discontinued by cooling the system to approximately 80° F. This is called a "chilled shutdown." To accomplish a "chilled shutdown," the temperature in the polymerizers is dropped over a period of three hours before pumping is stopped. Checks of conversion and viscosity (Figure 9) during the chilled period indicate that conversion remains constant while the viscosity continues to rise at a slow rate. This would indicate the inter-reaction of polymer molecules in a cross-linking process.

Factors Affecting Control: One of the factors affecting the relationship between hydrocarbon conversion and shortstop viscosity is the quality of the soap used as the emulsifier. Early in the program, this variable was recognized, and most of the soap used in the polymerization reaction was hydrogenated. Although the reaction times of hydrogenated soap are fairly uniform, the amounts of chain modifier required under the same conditions are variable (Table II). The modifier requirement of soaps from different suppliers and from the same supplier may vary considerably, thus making control difficult. Soap from Manufacturer A showed extremely high modifier usage. A change in the process whereby the fats were bleached and refined prior to hydrogenation and soap making reduced the modifier requirement to a normal level.

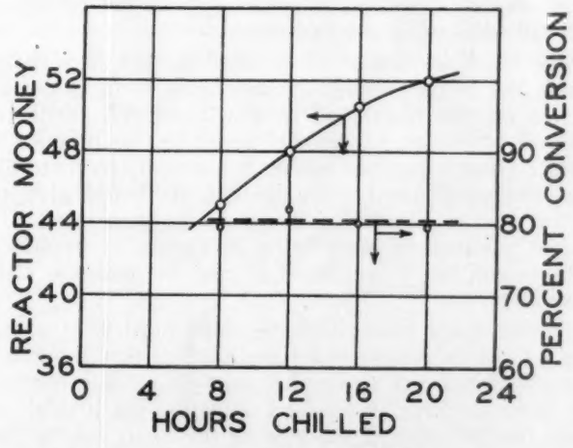

FIG. 9—Effect of chilled shut down. Mooney (polymer viscosity) and conversion related to the number of hours down.

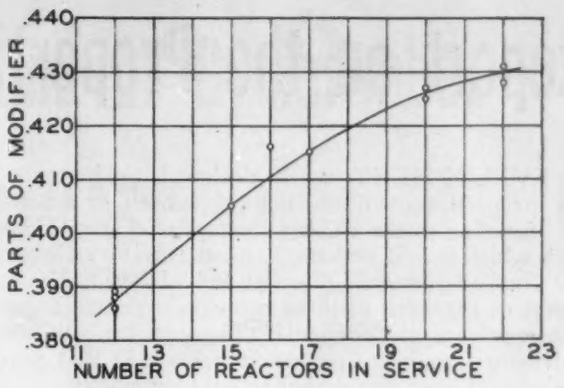

FIG. 10.—Effect of length of reactor chain on modifier requirement.

The purities of the fresh monomers are not necessarily factors in the control of continuous polymerization, since the fresh monomers are blended with recovered monomers to a constant purity. However, some impurities present, particularly in butadiene, may affect the reaction. Acetylenes may affect modifier requirements, whereas butadiene dimer will retard reaction rates.

Another factor that affects the modifier demand, and thus affects control, is the number of polymerizers in a continuous chain. Figure 10 represents a plot of the number of polymerizers vs. parts of modifier required to reach the desired shortstop viscosity and hydrocarbon conversion. Reduced modifier consumption is realized when continuous units are operated in short rather than in long reactor chains.

Summary

The continuous polymerization system for GR-S has been described with particular emphasis placed on the charging equipment. The three types of equipment employed for controlling charging, namely, reciprocating proportioning pumps, rotamatic controllers, and orifice meters, have all been found satisfactory with flows above ½ gpm. A reciprocating proportioning pump was found to be most satisfactory for charging chain modifier, which is charged at very low rates.

The other items of equipment used in the continuous polymerization system, part of which were originally installed for batch operation, have also been described. Factors which affect the reaction and methods of reaction testing and control have been discussed.

ACKNOWLEDGMENTS

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Report on the Properties of Dry Rubber

DEVELOPMENT work designed to improve the properties of crude natural rubber is a constant function of the Rubber Research Scheme (Ceylon), with which is affiliated the London Advisory Committee for Rubber Research (Ceylon and Malaya). The latest report of the work of these two closely related organizations covers activities in 1947. The report of the London Advisory Committee on research work in that year on the properties of dry rubber follows herewith:

Chief attention this year (1947) has been given to a continuation of the study of the resilience of natural rubber. Resilience may be regarded as a measure of elasticity and is of considerable importance in determining the suitability of rubber for tires and other important uses. The more resilient the rubber, the less is the amount of heat developed in a tire running at speed, and other factors being equal the cooler the rubber the more resistant is the tire to internal breakdown such as "heat blow-out", tread separation and ply looseness. Natural rubber is already superior in resilience to all synthetic rubbers, and the object of the work is to increase this important advantage.

It was reported last year (1946) that thorough purification of Hevea rubber leads to an improvement in resilience. This has now been confirmed and it has been shown that the improvement is significant and would be of practical importance if highly purified rubber could be prepared economically. Purification not only involves special treatment of latex to remove protein and water-soluble impurities, but also extraction with acetone or alcohol to remove others. The total yield of rubber is thereby decreased by over 5 percent so that apart from cost of treatment, there must be a 5 percent increase in price to compensate for loss of yield. Moreover, it is necessary to take precautions to avoid rapid deterioration which occurs when highly purified rubber is kept under normal conditions. In the circumstances, the results given by purified rubber are only of practical value in so far as they are a guide to the preparation of good quality material.

Results Given by Rubber Hydrocarbon

Having established the importance of purification, an attempt has been made to determine whether the results given by rubber hydrocarbon from various botanical sources are the same. A start was made with commercial unpurified Funtumia sheet and Landolphia vine rubber from Africa in comparison with Hevea smoked sheet. The wild rubbers gave resilience results intermediate between those of Hevea and general purpose synthetic rubber. The fact that the wild African rubbers are inferior to plantation Hevea may be due to the impurities which they contain, but partial purification by acetone extraction did not effect an appreciable improvement. Moreover, extracted Landolphia contains approximately the same percentage of rubber hydrocarbon as commercial Hevea smoked sheet.

Although Hevea rubber is superior to wild rubbers it is not suggested that there is a fundamental difference in the chemical structure of the rubber hydrocarbons. Molecular weight distributions and state of oxidation affecting molecular cohesions are more likely causes of the difference observed. It is hoped to study these problems in 1948.

The possibility of the existence of rubber hydrocarbons of different technical qualities was further examined by dividing highly purified rubber into a series of fractions depending upon ease of solution in organic solvents. It was found that the least soluble fractions gave the best results. The insolubility of the fraction may be partly due to molecular size and also the fact that the rubber behaves as if the molecules were lightly cross-linked (elasticity, insolubility, and lack of "tack."). It is not known why a small amount of molecular bridging should produce a better rubber, but if it is true of all gel or relatively insoluble rubber the preparation on estates of artificial gel should not be too difficult.

Vulcanizing and Mechanical Properties

As highly purified rubber and its fractions are somewhat of a scientific curiosity the vulcanizing and mechanical properties were studied in some detail in a range of mixes. In a tire-tread mix and the corresponding mix without carbon black the fractions all gave results superior to those given by smoked sheet when the fatty-acid content of the mixes was suitably adjusted. In the rubber-sulfur mix, however, it was very difficult to obtain reasonably satisfactory mechanical properties, particularly in the case of the most soluble fraction. In fact, this fraction hardly vulcanized physically, although the rate of combination of rubber and sulfur was not abnormal. The absence of physical effect may be due to oxidation during vulcanization or to the possibility that a trace of accelerator is essential for molecular cross-linking through sulfur.

The opportunity was also taken to show that carbon black reinforces a highly purified rubber-sulfur mix, and that except as an aid to vulcanization in the presence of zinc oxide, fatty-acids are harmful to the finished product, irrespective of whether carbon black is present or not.

In addition to the main investigation on the properties of highly purified rubber, it has been necessary to make complementary investigations on subsidiary issues. For instance, the method of preparing the dry rubber from purified latex appeared to have an effect on the properties of the vulcanized material but the differences were eventually shown to be related to traces of impurities still retained in the rubber.

The rapid oxidation of purified rubber is a danger which has to be guarded against because of its possible effects on the results of quality tests. The deliberate marked oxidation of smoked sheet led to inferior results, so that if purified rubber is markedly oxidized during mastication and vulcanization, it should give still better results if oxidation could be prevented. The easiest method of preventing oxidation is to add an antioxidant, but it is difficult to find one which is otherwise inert.

Antioxidants generally have some hardening, softening or vulcanization accelerating effect. Of those tried pyrogallol appears to be the most promising. There is no direct evidence of marked oxidation but it might explain the difficulty of vulcanizing the easily soluble fraction of purified rubber in a rubber-sulfur mix and the fact that the experimental error associated with the

(Continued on Page 234)

Preparation and Properties of Cyclorubber

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RUBBER isomers, or so-called cyclorubber, are formed when natural rubber is heated in anhydrous solvents with acidic catalysts. These thermoplastic rubber derivatives are more saturated than rubber and have lower molecular weights. They are resin-like substances which dissolve readily in hydrocarbon solvents giving solutions with low viscosities.

Rubber derivatives with properties of cyclorubber were no doubt obtained by early investigators, such as Himly in 1835 *(15)*, Goodyear in 1837 *(9)*, Parker in 1846 *(28)*, Macintosh in 1851, Mitchell in 1881 *(25)*, Weber in 1900 *(37)*, and Harries in 1910 *(11)*.

The molecular structure of these rubber derivatives as indicated by their properties appears to be different from that of rubber. Ring structures were postulated by a number of investigators. Harries assumed eight-membered rings in his work on rubber *(12)*; Ostromislenski *(27)* proposed in 1915 six-membered rings. F. Kirchhof *(21)* suggested in 1920 a tetramethylene rubber spiral with four-membered ring cross connections.

Staudinger and his co-workers, who coined the term "Cyclokautschuk," which is cyclorubber, published in 1926 *(34)* and 1929 *(31)* their exhaustive studies and experiments. They assumed that cyclization or six-membered ring formation within the molecule with linkage through the methyl group takes place; they considered also possible cross-linkage or cyclization between molecules. They submitted as proof of cyclization the following changes: increased density (0.992 vs. 0.920 for rubber), increased refractive index (1.5387 vs. 1.5222), lower heat of combustion (10,500 Cal/g vs. 10,700), greater resistance to higher temperatures than rubber (350°C vs. 300°C). They said that cyclization takes place faster than hydrogenation.

The Staudinger group reported that cracking of the rubber into smaller molecules occurs when heated with a catalyst in various solvents. They considered the cyclization products as mixtures of polyprenes with average molecular weights from 2,000 to 10,000. The molecular weight did not change with concentration, therefore no association of molecules took place. They found cyclorubber to be amorphous and differentiated between two types: monocyclorubber with two isoprene groups for each double bond and polycylorubber with five isoprene groups for each double bond. More recently, Bloomfield *(1)* found in his experiments with halogenated rubber that the observed lower unsaturation appears to be due to cyclization.

Note: Presented before the Division of Rubber Chemistry at the 113th Meeting of the American Chemical Society, April, 1948, Chicago, Ill.

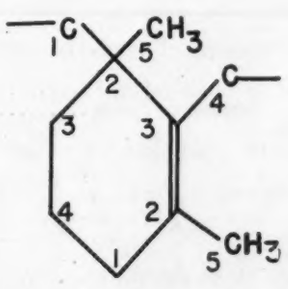

FIG. 1 — Cyclorubber unit.

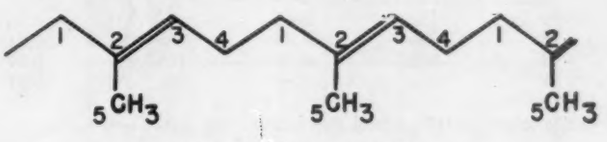

FIG. 2—Natural rubber.

The most probable structure of the cyclorubber unit in the light of present knowledge is the one similar to cyclo-geraniolene, reported by Tiemann *(35)* and shown in Fig. 1. Natural rubber as a *cis*-isoprene polymer is shown in Fig. 2.

When isoprene units are combined within the molecule, an open partly saturated chrysene-like structure may result with one double bond for each two isoprene units, as shown in Fig. 3.

If isoprene chains are aligned in opposite or in the same direction, they may cross-link to ten-membered rings, in which remains 50% unsaturation, as shown in Fig. 4. The *cis* position of the methyl group may hinder the formation of a six-membered ring.

Preparation of Cyclorubber

Cyclorubber can be prepared by dissolving rubber partly or completely in a suitable anhydrous solvent, most frequently a hydrocarbon. An anhydrous acidic

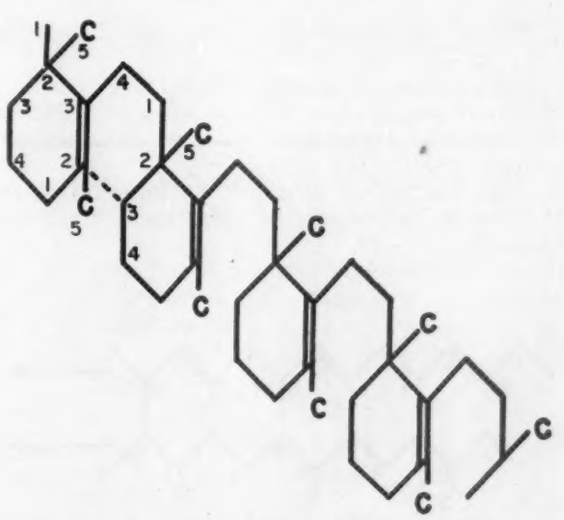

FIG. 3—Cyclorubber, chrysene-like structure (when linked within the molecule).

TABLE I—MOISTURE VAPOR TRANSMISSION RATES (M.V.T.R.) OF GLASSINE PAPER COATED WITH HOT MELT

% Marbon B in Paraffin Wax 135/137°	Viscosity 140°C Sayb. Univ. Sec.	Coating Lbs./Ream	M.V.T.R. in g/100 sq. inch/ 24 hours/100°F/ 95% Rel. Humidity	
			Uncreased	Creased
0*	—	—	0.18	0.947
5	46.4	5.43	0.15	0.30
10	102	6.48	0.20	0.36
15	266	7.29	0.54	0.63
20	950	6.29	0.57	0.44
25	1570	12.67	0.62	0.81

*A commercially paraffin waxed paper, both sides.

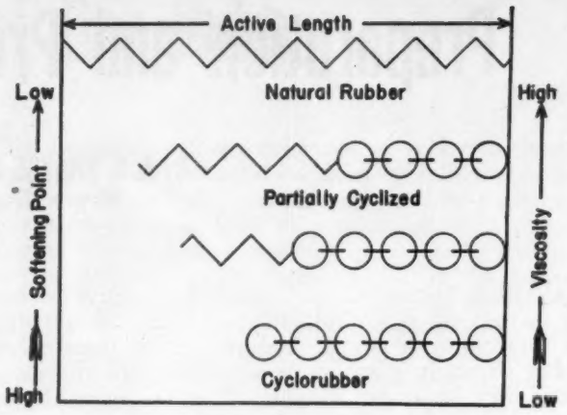

FIG. 5—Linear cyclization of rubber.

catalyst of the types mentioned below is added. Heat is applied with thorough mixing until the exothermic reaction starts. When the reaction is carried out at atmospheric pressure, reflux equipment has to be attached. For closed systems, pressure equipment has to be used. During the reaction a very viscous solution of rubber is transformed to a thin fluid and the progress of the reaction can be estimated by the very great drop in viscosity and color change.

The reaction time and temperature depend on the solvent and the catalyst used. The reaction can be stopped at certain stages of completion by adding alcohol, acetone or water, which also separate the crude cyclorubber from the solvent, catalyst and impurities. The crude cyclorubber is then further purified by washing and reprecipitation. After drying and grinding, the end products are nearly colorless granules or a nearly white resin powder.

The following catalysts and conditions can be used:

1. Concentrated sulfuric acid in a 1% rubber solution in benzene *(13)*.
2. Organic sulfonic acids *(7)*.
3. Amphoteric metal halides *(2)*.
4. Hydrogen chloride, anhydrous metal halide, or stannic acid *(3)*.
5. Boron halides and aryl diazonium fluoborates *(4)*.
6. Hydrogen fluoride *(12, 22, 26)*.
7. Intermediate formation of rubber hydrochloride *(31)*.
8. Mixed organic-inorganic oxonium compounds *(17,18)*.
9. Phosphorous oxychloride *(30,36)*.
10. Cresol-phenol and inorganic acids *(8,10,24,38)*.
11. Thermal condensation in ether solution under pressure at 250°C *(34)*.
12. Slow heating of rubber in vacuum to 300°C *(34)*.
13. Heating in presence of surface-active substances *(19)*.
14. Hydrogen under pressure (50 atm.) at 270-280°C with platinum black in carbon tetrachloride *(33)*.
15. Silent electric discharge *(16)*.

It has been reported that products similar to cyclorubber can be prepared from isoprene and certain synthetic rubbers. The following may be mentioned:

1. Isoprene in benzene solution with stannic chloride *(2)*.
2. GR-S type synthetic rubber solution with phenol or cresol at 180°C *(6)*.
3. Polyisoprene and copolymers of isoprene with styrene and other monomers *(5)*.

There are indications that synthetic cyclorubber, built up from isoprene, shows *cis* and *trans* configuration *(14)*, while natural rubber may give only *cis* isomers *(29)*. The product prepared from isoprene has a much lower softening and decomposition point. It also oxidizes rapidly in air *(2)*.

Some of the catalysts or conditions mentioned above are not economical; they often give low yields. The use of sulfuric acid as catalyst results in dark products. Amphoteric metal halide catalysts usually give a commercial product containing significant amounts of the metal component as impurity. Numerous patents cover different preparations and uses.

A novel cyclorubber product, which has a light color with a minimum amount of impurities, is Marbon B, prepared by cyclizing natural rubber with hydrogen chloride as catalyst in the presence of phenols *(24)*.

In general, rubber cyclized at lower temperature seems to give cyclorubber with higher molecular weight. When the temperature of reaction is raised, the average molecular weight of the cyclized rubber becomes increasingly lower and the product is more easily soluble and has a lower viscosity.

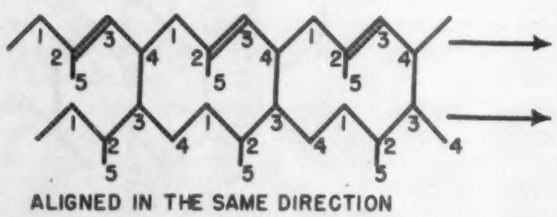

FIG. 4—Cyclorubber, cross-linked to ten-membered rings with 50% unsaturation remaining.

TABLE II—PHYSICAL PROPERTIES OF MARBON B

Specific Gravity at 25°C	0.97
Softening Point or Distortion Point	70-90°C
Shore "D" Hardness	85-90
Viscosity Limits (25% in toluene) No. 4 Ford Cup at 25°C	40-140 sec.
Volatile Matter (30 min. at 200°C)	1% or less
Ash	Less than 0.3%
Index of Refraction at 25°C	1.537-1.539
Burning Time (ASTM. D. 568-43)	124 sec.
Burning Rate (ASTM. D. 635-41T)	0.79 in/min.
Water Absorption in 24 days	Less than 0.1%

TABLE III—ELECTRICAL PROPERTIES OF MARBON B

Dielectric Constant at one megacycle	2.6-2.7
Power Factor at one megacycle	0.0008-0.0018
Insulation Resistance ohm-cm	2.5×10^{11}
Arc Test	No carbonization

During the preparation of cyclorubber the molecule is also shortened by the increasing amount of linear cyclization, as indicated in Fig. 5.

Other causes of shortening the molecule are cracking, branching and cross-linkage. Using certain solvents and catalysts, the cyclorubber produced has a fairly constant average molecular weight.

Gutta-percha, the *trans* isomer of rubber, is more inclined to cyclize than rubber. At temperatures above 300°C the products from rubber and gutta-percha are reported to be identical *(31)*.

Properties of Cyclorubber

Cyclorubber is an amorphous resinous isomer of rubber with a low viscosity in solutions. It is more saturated and more stable at higher temperatures than rubber itself. The empirical formula for cyclorubber is the same as for rubber $(C_5H_8)_x$; its density is 0.992 at 25°C and the refractive index is 1.5387 *(34)*. Cyclorubber is soluble in aliphatic and aromatic hydrocarbons, in higher ethers, in hydrocarbon oils and in petroleum wax of the crystalline and amorphous type. It may be partly soluble in ether, but is insoluble in water, lower alcohols and acetone.

The physical properties of commercial cyclorubber vary according to the method of preparation. In regard to molecular weight studies, Staudinger *(31)* reported first that he obtained molecular weights from 2,000 to 10,000 by the cryoscopic method. Later molecular weight determinations by the osmotic pressure method give for cyclorubber molecular weights of about one fifth to one third of the molecular weight of the original natural rubber *(32)*. The relative average molecular weight could be estimated from its viscosity with correction factors for possible branching. Cyclorubber of higher molecular weight can be separated from that with lower molecular weight by ether, since ether dissolves the lower molecular weight cyclorubber.

For the determination of the unsaturation the iodine chloride method, modified by Kemp and Mueller *(20)* and Lee, Kolthoff and Mairs *(23)*, gives the best results. About 50 to 60% unsaturation remains in most commercial cyclorubbers.

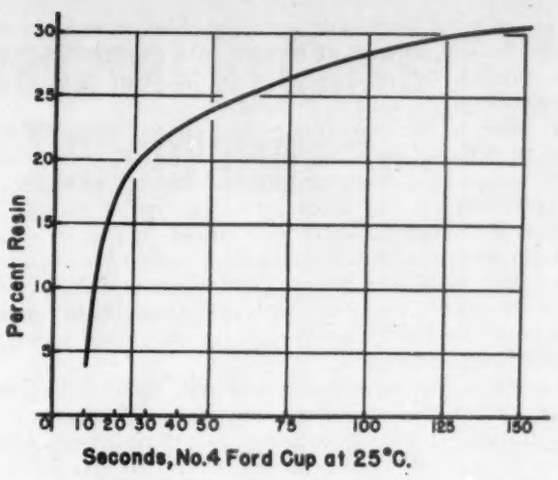

FIG. 6—Effect of concentration on the viscosity of Marbon B solutions in toluene at 25° C.

Cyclorubber autooxidizes and takes up from the air 3 to 5% oxygen, which is one atom of oxygen for 5 to 8 isoprene units *(31)*. Oxidation is prevented by the addition of antioxidants.

The cyclorubber Marbon B is a granular, pale amber, resin-like product, made from crepe rubber. When milled at 100°C or higher into sheets, it is a tough, horny and fairly flexible transparent material, but it has no sharp melting point. Its sintering point is between 125 and 130°C. Marbon B is extremely resistant to moisture penetration (see Table I). Other physical properties are shown in Table II and electrical properties in Table III.

While Marbon B in the free state shows little solubility in the oxygenated solvents, which are commonly used in lacquers, Marbon B - mineral spirits solutions possess a wide tolerance for these materials when they are used as diluents. The tolerance of these solvents in Marbon B - mineral spirits solutions may be arranged in decreasing order of efficiency as follows: esters, ketones, and alcohols. The tolerance in each class of solvents also increases with increasing hydrocarbon chain.

In Table IV are shown the tolerances (dilution ratios) of several representative oxygenated solvents in a Mar-

TABLE IV—TOLERANCE OF OXYGENATED SOLVENT DILUENTS IN 10% MARBON B - MINERAL SPIRIT SOLUTIONS

Oxygenated Diluent	Dilution Ratio parts by volume	Viscosity Change
Amyl Acetate	3.44	Slight
Butyl Acetate	2.64	Slight
Methyl Ethyl Ketone	0.99	Slight
Acetone	0.44	Slight
Amyl Alcohol	0.96	Slight
Butyl Alcohol	0.52	Slight
Ethyl Lactate	0.52	Increase
Cellosolve	0.40	Slight

TABLE V—VISCOSITY AND AGING OF 25% MARBON B SOLUTIONS

	Viscosity in Seconds With No. 4 Ford Cup at 24° C	
	Original	After 30 Days
Viking Solvent 60-70	30	33
Sovasol No. 1	38.5	39.5
Petrolbenzol	40	40
V.M.P. Naphtha	54	55
Benzene	57	55.5
Xylene	57	59
Sovasol No. 73	48.5	62
Enjay No. 2	65.5	67
Apco Solvent No. 48	54	68
Sovasol No. 74	73	72
Sovasol No. 75	99	100
Enjay No. 3	130	134

bon B - mineral spirit solution. The dilution ratio is expressed as the volume of diluent in milliliters tolerated by a solution comprising 0.1 g of Marbon B in 1 ml. of mineral spirits, a 10% solution.

In Table V are shown the data on the viscosity and aging in diffused light of Marbon B in some representative commercial hydrocarbon solvents. The effect of concentration on the viscosity of a typical sample of Marbon B in toluene solution is shown in Fig. 6.

There seems to be a definite relationship between viscosity and distortion point (softening point). In the range where the viscosity decreases from 96 to 69 seconds with the Ford Cup No. 4, the softening point increases from 75 to 84° C.

Marbon B was heated in closed vials up to 400° C and showed after this treatment only 2 to 3% decrease in unsaturation. It was decomposed to a dark-brown liquid, the main part of which distilled over between 200 and 340° C. When Marbon B was chlorinated at 20 to 26° C, it absorbed 10 to 12% chlorine.

The unique properties of cyclorubber make it possible to use it extensively in hot melts, lacquers, for paper coating, inside paints, electrical insulations, transparent films, printing inks, cutting blocks, adhesives, and in rubber compounding. In hot melts with paraffin wax and other types of waxes, Marbon B, added in a small percentage, imparts toughness and increases moisture proofness by improving the flexibility.

As a lacquer component, Marbon B has been found very valuable in the coating of paper, glassine, cellophane, and cellulose acetate. These coatings possess the property of heat sealing under low pressure. Marbon B gives a waterproof coating, when applied as lacquer or varnish in suitable solvents. A lacquer enamel can be prepared in a pigmented milled vehicle. For paints to waterproof concrete surfaces, Marbon B is unaffected by hot and cold water, alkalies and dilute acids, but is attacked by strong acids such as concentrated nitric acid.

Marbon B is compatible with commercial resins, like ester gum, chlorinated waxes, terpene and cumar resins, and gives transparent, glossy and hard films.

In rubber compounding Marbon B increases the modulus, the tensile, the tear resistance and hardness, all properties of a very good reinforcing agent for natural and synthetic rubbers. Its active unsaturation gives evidence of covulcanization products with rubber. Marbon B is used in insulation compounds for wires, submarine and radar cables.

In the compounding of high grade materials in the packaging, insulation, paint, and rubber industry, cyclorubber with its outstanding qualities for moistureproofing and its electrical properties is especially valuable.

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On-the-Spot Chargers Prove Economical for Industrial Trucks

WASTED time to and from central charging stations can be eliminated, particularly in the case of small electric trucks, by installing "spot chargers" at strategic locations throughout the plant.

Many plants have found it advantageous to charge industrial trucks in the department where they are used rather than take them to a central charging station. Daily trips to and from the central station are eliminated. Thus, time is saved and peak congestion periods at elevators, in narrow aisles, and at the central station, are avoided.

Spot charging stations can be located in out of the way corners. At the end of the day, the truck is put on charge adjacent to its field of operation. This is accomplished without taking the battery from the truck. The next morning the truck is ready for work merely by disconnecting leads from the charger.

This method of charging is particularly well suited to smaller trucks; larger plants save as much as an hour per day per truck by spot charging and elevators and passageways are left free for the handling of raw materials, goods in process, and finished goods.

Butadiene-Styrene Chemical Rubbers Polymerized at Low Temperatures

By W. F. TULEY

Naugatuck Chemical Division, U. S. Rubber Co., New York 20, N. Y.

ANY discussion of butadiene-styrene chemical rubbers polymerized at low temperatures is a particularly timely one. GR-S as it has been is like a boy, a husky one, who has been a pretty important member of the family, but among those who have known him by experience or reputation he has received more abuse than credit for what he has done. Some have thought this GR-S boy would never grow up and many have been quite sure he could not survive unless society gave him continuing protection.

This GR-S boy has been an important factor in our economy for about seven years. He fought the war with credit but has been difficult and slow to demobilize. There is now some indication that the GR-S boy is maturing and on his own long-term merits may justify some of the economic, technological and political disturbances which he has fomented on an international scale.

Perhaps some people in the rubber products industry would like to be rid of the problems of general purpose chemical rubber. Some say "put it away on the shelf until another national emergency requires it to be brought out and dusted off." I will not argue this point because we are using GR-S in substantial volume (probably 350,000 long tons this year) with benefits to both manufacturers and consumers of rubber products. The Rubber Act of 1948 effective for the period of April 1, 1948, to June 30, 1950, requires that GR-S shall continue to be used at a rate not less than 200,000 long tons per year.

If GR-S is to be used because the natural rubber supply is inadequate or for national security reasons or for cost or quality advantages, then let us make every possible effort to so improve the quality of chemical rubber that its use does not depend on mandatory directives under an act of Congress. Incidentally, the September, 1948, report of the Rubber Division, Office of Domestic Commerce, shows that in June, 1948, 8,547 long tons or 28% of the total GR-S consumed was used voluntarily or outside the mandatory requirements in transportation products.

Progress in GR-S Quality Improvements

It has been the boast of the synthetic rubber industry that its technologists could produce a product "tailored" to the needs of the consumers. To a certain extent this claim has been supported.

High standards have been maintained for cleanliness and uniformity. Special types of GR-S polymers have been made with properties designed to meet the needs of different classes of rubber products, for example: low ash, double-strained GR-S *(1)* for wire insulation; low viscosity GR-S for sponge rubber; more tacky rosin-soap types *(2)*, and several non-staining, non-discoloring types.

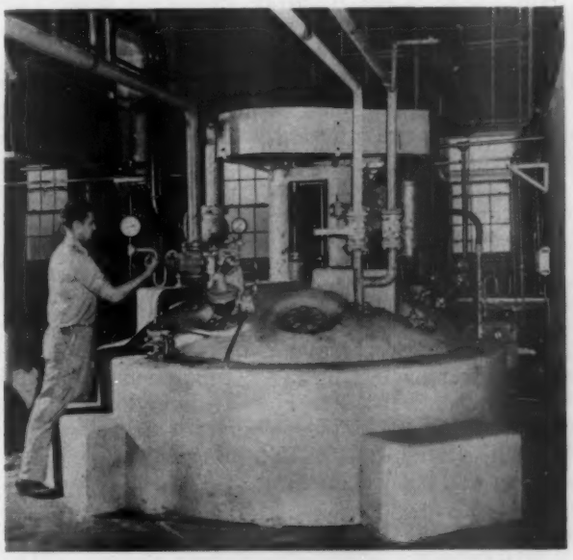
However, in retrospect at some future time, our progress until recently in producing GR-S of superior quality will appear puny in comparison with what is to follow.

We are now accomplishing on a large commercial scale, the first major advance in GR-S quality since the production of butadiene-styrene chemical rubber was established in this country in 1942. I emphasize that this is a major advance in quality but I hope it will be entirely clear from later comments that in several important respects we are still far short of our objectives and needs and possibilities.

Before discussing the low temperature GR-S development in more detail, it may be well to review, first, the major operations in producing GR-S, and second, the variables which research and development can attack for quality improvements. This applies only to polymerization of aqueous emulsions.

First, the principal steps in manufacturing GR-S are:

1. Charging the reactors.
2. Polymerization.
3. Separation of unreacted monomers from the polymer.
4. Coagulation.
5. Dewatering and drying.



This insulated 3,750-gallon reactor is in operation at the Borger, Texas, plant operated by U. S. Rubber. A refrigerating liquid circulates through the tank jacket. An 8-inch layer of cork and asbestos keeps out heat.

Note: This article is based on a talk given by the author before the New York Rubber Group on October 15, 1948.

Some of the important variables which are subject to control or choice and are critical in determining the quality of finished polymer are:

1. Choice of Monomers and proportions.
2. Emulsifier, catalyst, modifier, pH control.
3. Polymerization temperature.
4. Conversion.
5. Short-stop and stabilizer.
6. Coagulant.

This condensed list may appear to present the scope of the field in an over-simplified manner. Actually, the possible combinations are almost unlimited. The problem is made more complex and tedious by the inherent difficulties due to the nature of high polymer products. They can not yet be well characterized and defined by precise methods. It is unnecessary to emphasize to those familiar with rubber compound evaluation, the problem faced by the polymer chemist in charting the course of his development by the usual laboratory and service performance tests.

The six classes of variables which have been listed are all potentially and actually important but only two will be discussed here.

Hundreds of Monomers Tested

The possibilities apparent in varying the monomers have been very intriguing. A great amount of work has been done with hundreds of monomers other than butadiene and styrene, for example, isoprene *(3)*, dichlorbutadiene, mono- and di-chlorstyrene *(4)* and vinyl pyridine *(5, 6)*. Quite promising results have been obtained with some of these which will probably have applications in the long range development, perhaps in combination with low temperature polymerization.

During the year or two following the end of the war there was considerable pessimism among rubber technologists and the rubber industry in general as to the practical possibility of materially improving the quality of GR-S and maintaining a cost which would be competitive with natural rubber. This was partly due to anticipated decrease in the price of crude rubber based on estimated world consumption much below the actual consumption as it has been and partly on lack of confidence that the quality of GR-S could be improved without considerable increased cost.

This point of view may possibly be correct in respect to the possible selling price of general purpose chemical rubber, if the price of natural rubber again becomes unduly depressed. No one can say just what quality must be developed in chemical rubber to sustain its use, if first quality natural rubber sold for half the price of the manufactured rubber.

The serious difficulty with any new monomers is the large new capital investment and the higher cost for the production and processing of any which have been promising in new types of polymers. Actually only one other monomer has established a regular use in addition to butadiene and styrene. This is divinyl benzene *(7)* used in the "cross-linked" polymers which are blended with both synthetic and natural rubber to improve processing and reduce shrinkage.

Low Temperature Production Program

In respect to quality, there is now a more optimistic outlook for the competitive position of butadiene-styrene chemical rubber. GR-S polymerized at temperatures near or below freezing has now been in limited commercial use in tires for several months. There is general agreement among tire manufacturers that the low temperature GR-S with the most favorable compounding gives an increase in tread mileage of passenger tires of about 30% over the best natural rubber treads. Under some driving conditions the improvement is much more than 30%.

The tire manufacturers have now taken positive positions on their future minimum consumption of GR-S made at 41°F. On the basis of this stated consumption requirement the Reconstruction Finance Corporation has approved in principle the conversion of half of the present operating capacity to produce GR-S at 41°F. This capacity of 183,000 long tons to be converted of the 375,000 long ton annual capacity presently operating includes from 25% to 100% of the capacity in eight of the nine producing units.

This program for conversion of 50% of the present operating capacity is based on the stated needs of the tire manufacturers, although it is understood that the production will be available as far as it will go for distribution to manufacturers of all rubber products. The quantity of 41° F. GR-S which this program will provide will probably be no more than enough for the tire industry—perhaps not enough of its use extends into passenger tire carcass and treads, sidewalls and carcass of large size tires. It is important that manufacturers of non-transportation products using GR-S on a voluntary basis should determine the merits of low temperature GR-S in their products and make their requirements known so that adequate capacity will be provided.

Technical Basis for Program

The technical basis of this program for 41° F. GR-S needs to be clearly presented to the technical men in the industry who will be responsible for using the product; first, as to those properties which have been substantially improved; second, the important properties which have not yet been materially improved, and third, the possible changes in the composition of the polymer resulting from the decrease in the temperature of polymerization. The first two are summarized below. The third will be treated in more detail.

Properties Which Have Been Substantially Improved (in Carbon Black Stocks)

1. Tensile strength with channel black compounds at room temperature is increased about 1,000 lbs.; at elevated temperatures or after aging, tensile strength is increased proportionately, in comparison with regular GR-S.
2. Abrasion resistance is increased 50% over regular GR-S and is 30% better than the best natural rubber tread, under normal driving conditions.
3. Flex-cracking and cut-growth is improved over regular GR-S; these properties are equal to or adequate in comparison with natural rubber.
4. Processing is good, except with RF black it is more difficult than regular GR-S with EPC black. Improvement can be expected in processing.

Important Properties Which Have Not Yet Been Improved to Any Important Degree

1. Tensile strength of non-black compounds is improved but is still not comparable with natural rubber.
2. Hysteresis or heat build-up.
3. Stiffening at low temperatures.
4. Atmospheric cracking.
5. Tackiness of raw stocks.

The properties listed above are very important in the fabrication and performance of a large proportion of the rubber industry's products. Recognition of these properties in which the low temperature GR-S is still deficient will avoid disappointment in attempts to use it where its properties may not be fully satisfactory.

Effects of Low Temperature Polymerization on the Composition of the Polymer

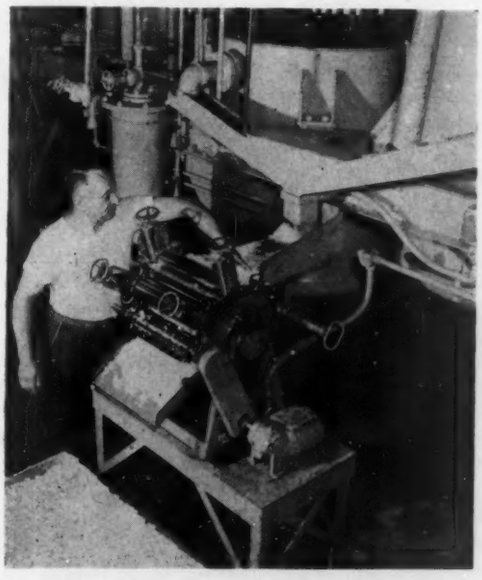
Low temperature polymerization has been made a practical commercial process by the discovery of new catalysts to speed up the polymerization and by technical development of the low temperature polymerization systems which are more sensitive to unfavorable influences than is the conventional high temperature process.

There were definite indications in the early work (as early as 1942) on butadiene-styrene polymers *(8)* that lower polymerization temperature gave higher tensile strength. Lower temperature added hours, days or even weeks to the time required to get satisfactory conversion of the monomers to the polymer. This set a practical minimum for temperature in plant operations. Standard polymerization temperatures are 117° and 122° F.

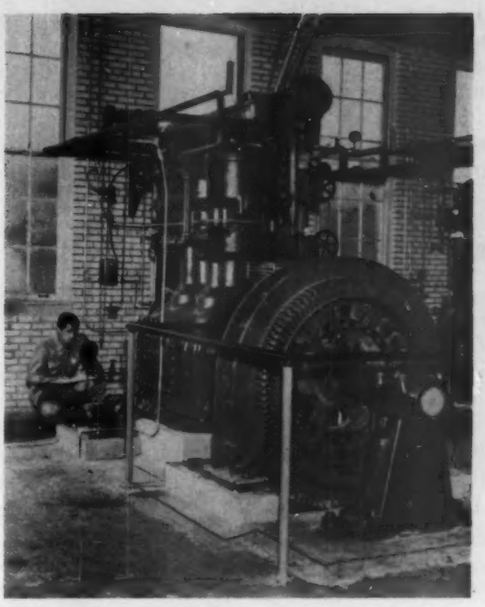
Low temperature polymerization of butadiene and styrene seems to produce a polymer *(9)* which in its structure is more regular; thus, may be more like natural rubber in its fiber structure. Natural rubber is a straight hydrocarbon chain without branching except for the methyl groups attached to every fourth carbon atom in the succession of isoprene units. The isoprene units in natural rubber are combined in a uniform manner corresponding to 1, 4-addition and the methyl groups are all in the *cis* position, that is, on the same side of the chain rather than on the opposite sides. This regularity in the structure of natural rubber is indicated by its tendency to crystallize as shown by the X-ray pattern of rubber under tension *(10, 11)*.

GR-S is a heterogeneous structure. It contains the dissimilar aromatic and aliphatic groups derived from styrene and butadiene. It contains some branched chains. Its units are combined by both, 1,4- and 1,2- addition. Its structure is more *trans* than *cis*.

There is evidence that as the polymerization temperature is decreased, the structure of GR-S becomes more regular although it does not approach that of natural rubber. The proportion of 1,4- addition increases slightly and there is an increase in the *trans* configuration with less of the *cis*. The *cis* structure is practically eliminated at 0° F. temperature of polymerization. If this is a factor affecting quality, then better quality should result as the polymerization temperature is carried down to 0° F.



Passing low temperature GR-S after coagulation and washing over a laboratory Oliver filter in the pilot plant at Naugatuck, Conn.



One of the motor-driven ammonia compressors which provide refrigeration for production of low temperature synthetics at the Borger plant.

This increase in regularity is indicated by some tendency to crystallize with high butadiene polymers formed at sub-freezing temperatures. This is shown by faint but definite X-ray patterns which have not been obtained with high temperature polymers.

Butadiene-styrene polymers formed at low temperatures have slightly higher brittle points than polymers of the same monomer proportions formed at higher temperatures.

Polybutadiene formed at 41° F. gives significant T-50 values in proportion to the combined sulfur whereas high temperature polymer gives no significant T-50 values. Typical results on T-50 tests are *(12)*:

	122°F. Polybutadiene or Regular GR-S	41° F. Polybutadiene	Natural Rubber
Uncured	(—39°C)	+6 °C	+18°C
1% Combined Sulfur	(—39°C)	—4.5°C	+ 5°C

The crystallizing tendency of GR-S of butadiene copolymerized with as much as 30% of styrene and made at 41° F. is too weak to give a significant T-50 result but the effect of decreased polymerization temperature on polybutadiene is a strong indication that lower temperatures of polymerization increase crystallinity because of more regularity in structure.

Thus, a more regular structure, less branching and cross-linking of chains and perhaps more uniform molecular weight constitute the present indicated explanations for the improvement in quality with reduced temperatures of polymerizations.

The small increase in tensile of GR-S polymerized at 41° F. in non-black compounds is a puzzling question. It has been suggested that the high tensile strength of vulcanized natural rubber may be attributed to crystallization or fibering under stress which increases the tear across the direction of strain. In carbon black stocks, the pigment particles behave like rigid units in the rub-

ber molecules and inhibit the extension of ruptures. It may be that a higher degree of regularity with increased tendency toward crystallization is required to develop high gum tensiles with chemical rubber. However, there are indications that substantial improvements in quality of non-black stocks may be obtained in the sub-freezing range of low temperature polymerization.

Sub-Freezing Polymerization

Development has naturally extended to butadiene-styrene polymerizations at temperatures below freezing *(13, 14)*. In this case sufficient anti-freeze must be added to the emulsion to prevent freezing. Good results are obtained with ethylene glycol, glycerol and methanol. The higher alcohols excessively increase the hydrocarbon solubility in the alcohol-water phase, thus upsetting the colloidal system. Methanol is preferred as an anti-freeze because of the three it affords the easiest recovery process.

Very satisfactory rates of polymerization have been obtained and the process has been handled in plant equipment at both 14° F. and 0° F. Refrigeration requirements are considerably increased at lower temperatures. The refrigeration capacity required for 14° F. is roughly twice that at 41° F. and at 0° F. it is increased about three times.

Plant investment, chemical costs and processing costs at sub-freezing temperatures will add somewhat to the cost of producing sub-freezing polymers as compared to the 41° F. or present 122° F. GR-S. This added cost will not be prohibitive if real additional quality is found for the lower temperature.

Some Improvement in Properties

Sub-freezing polymerization does further improve tensile strength and other properties as compared to the 41° F. polymer. The magnitude of the increase in quality must be weighed against the estimated increased cost to determine the importance of very low temperature polymerization. The catalyst systems for polymerization at sub-freezing temperatures, the selection of short stopping agent, stabilizer, and other variables have not been fully developed. It is possible that the ultimate quality obtainable by very low temperature polymerization has not yet been attained. We are today, in respect to sub-freezing polymerization, about where we were on the 41° F. polymer some 18 to 24 months ago.

Perhaps the move to lower temperatures will gather momentum just as has already occurred on the 41° F. polymer. If so, the installations for 41° F. GR-S will only need expansion to handle the greater refrigeration load, plus other less extensive charges and additions to plant equipment.

Conclusions

Whatever the temperature range finally determined to give the best quality-cost values, it can be expected that both fatty acid and rosin acid types of polymers, non-staining types and also carbon black masterbatches, will be available. These will have the characteristics with which the industry is now familiar in combination with the superior qualities of the low-temperature polymer.

This almost revolutionary development in the position of general purpose chemical rubber is the result of co-operation in the industry-government team. Many individuals and organizations have made important contributions. It has been brought to the present climax, particularly through the leadership and support of the Reconstruction Finance Corporation, Office of Rubber Reserve.

It would be less than justice to close this discussion without further reference to the determination and persistance, the technical skill and imagination which those engaged in chemical rubber development now see culminating in a really superior product. There is drama here which in its magnitude and importance is a rare occurrence in the technical and industrial world. The consumers of this superior American man-made rubber will certainly share in this satisfaction. The progress now demonstrated gives promise of more to come.

Perhaps this GR-S boy is really growing up. He will not be hard to live with. He will take his share of recognition but will not crowd his older brothers too roughly. Increasing industrial consumption requirements will make room for the natural as well as the several types of chemical rubbers.

Forecasts

1. Low temperature polymerized GR-S will displace present standard types of GR-S as rapidly as it is made available.

2. On a quality basis, low temperature GR-S will be preferred in a substantial total volume over natural rubber even though the latter sells at a somewhat lower price.

3. Demand for low temperature GR-S will probably exceed supply for the next 12 to 18 months and will probably not be adequate until almost all of the GR-S production facilities have been converted.

4. There is no present indication that low temperature GR-S will, in the near future, increase the total consumption of GR-S above the present level at the expense of natural rubber.

5. Consumers of rubber products will benefit from better performance through the use of low temperature GR-S.

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Oxidized Lignin as a Reinforcing Agent for Rubber

By R. A. V. RAFF and G. H. TOMLINSON II
Howard Smith Paper Mills, Ltd., Cornwall, Ontario, Canada

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UNTIL recently, rubber technologists and lignin men met only rarely, since their respective fields did not seem to offer much ground for joint research. This situation is now changing, and it is felt that a brief review of the lignin situation as such should be given before actually discussing the use of oxidized lignin in rubber.

Lignins are among the most abundant naturally occurring, high molecular weight, organic substances, being present to the extent of about 25% in wood, acting therein as fiber bonding agents. Unlike cellulose, the other important constituent of wood, the lignins have, until recently, found little industrial application, and the manufacture of purified lignins has been virtually confined to pilot plant scale.

The separation of lignins from wood of necessity requires the use of a selective chemical treatment whereby one or the other compound is dissolved. In the chemical pulping processes the major portions of the lignins are dissolved, thus allowing the disintegration of the chips into the individual fibers which, on separation from the liquor, and with or without further chemical treatment, form the principal raw material for the paper industry.

The sulfite cooking process removes the lignin as lignosulfonic acids, which unless desulfonated or condensed by some further treatment, are water-soluble. Several uses for this type of lignin have already been found, although the total requirement for such purposes is only a small fraction of the quantity available. One of them, the manufacture of vanillin, is being carried out by Howard Smith Paper Mills Limited in Cornwall, Ontario.

The alkali pulping processes, that is, the soda process and the sulfate (Kraft) process, yield lignins which, although soluble in aqueous alkali, can be separated from such solutions by precipitation with acid, and are subsequently insoluble in water. Lignin isolated from these liquors has been used in the present investigation.

Normally, the liquors from the alkali pulping processes are evaporated and burned for the recovery of their inorganic content and for the generation of steam. It can easily be seen that the amount of alkali-process lignins contained in the spent liquors is tremendous, and that burning such a complex molecule as lignin for its fuel value only is wasteful. This has been well recognized by the pulp industry since the beginning, as proven by the very large number of publications and patents dealing with this subject.

Soda Lignin Used in Plastics

A large field for soda lignin has been opened up in its use for laminated plastics through the work of the Howard Smith Paper Mills. The method finally developed for the isolation of the lignin is carried out as follows: Black liquor is carbonated with flue gas to a pH at which 40% to 60% of the lignin precipitates in the form of an acid salt which, upon heating the mixture to 90° C., melts and collects as a viscous tar. The hot tar is separated by continuous decantation and dissolved in hot water. This solution of the so-called "lignin acid salt" is then precipitated with sulfuric acid under controlled conditions, filtered and washed on a rotary filter, and dried. Most of this lignin is being used at present in laminating papers which are converted by heat and pressure to laminated plastics, sold under the trade name of "Arborite."

Deciduous soda lignin was initially given preference over coniferous kraft lignin, since the former possesses a lower melting point and a better flow. It has further proven to be of importance when preparing lignin for molding purposes to avoid oxidation during carbonation by carbonating very rapidly, using specially designed spray towers and a very high rate of liquor recirculation.

The lignin thus prepared has a melting point of 160-170° C., and a methoxyl content of 19.75%. A 10% solution of this lignin in cellosolve has a viscosity of 4.3 cp. Coniferous kraft lignin, which at least at present is not being used for molding purposes, has a melting point of 210-220° C., and a methoxyl content of 13.0%. A 10% solution of this lignin in cellosolve has a viscosity of 4.9 cp.

Although relatively large quantities of lignin are already being converted into usable products, with plans underway to increase the daily lignin production in Cornwall to 25 tons, and to construct a new and larger laminating plant in Montreal, considerable quantities, that is, all of the kraft lignin and a large portion of the soda lignin, are still being burnt.

Initial Experiments in Rubber

In searching for new uses of alkali lignins, attention was first drawn to the possibility of using lignin in rubber by an article of Mischustin*, according to which low density rubber (d = 1.3) of high flexibility and strength can be obtained by incorporating one part of lignin (treated with 5%

Note: This paper was presented before the Rubber Division, Chemical Institute of Canada, June 9, 1948, Montreal, Canada.

* Mischustin, I. U., *Kozhevenno-Obuvnaya Prom.*, No. 8, pp. 35-36 (1940).

† Keilen, J. J., and Pollack, A., *Ind. Eng. Chem.*, Vol. 39, pp. 480-83 (1947).

Table I—Influence of Oxidation of Lignin By Air

	Unoxidized	*Oxidized*
Aspen Wood Alkali Lignin		
Melting point (°C.)	167.	250.
Viscosity (CP)*	4.24	4.55
Methoxyl content	19.75	14.60
Coniferous Kraft Lignin		
Melting point (°C.)	210.	360.
Viscosity (CP)*	4.92	6.52
Methoxyl content	13.00	13.00

*10% solution in cellosolve.

aqueous Bismark-brown) and one part of kaolin into two parts of rubber. The interest in this possibility was deepened by a paper given by Keilen and Pollack†.

Since the specific gravity of lignin is only 72% of that of EPC black, a given weight of lignin would provide 1.4 times the volume loading of the same weight of carbon black. A further advantage consists in the low tinctorial properties of the lignin, since small amounts of white pigments are sufficient to fade the dark color of the lignin into a light tan, which may be further masked by colored pigments. This property of the lignin had already been explored in preparing red and orange lignin laminates by adding small amounts of titanium dioxide and iron oxides of various shades to the pulp beater. When lignin masterbatch is compounded in a recipe without using white pigments, (such as the standard Rubber Reserve tread recipe), the cured rubber compound is indistinguishable in appearance from a compound using EPC black.

These apparent advantages of the substitution of lignin for carbon black to the rubber manufacturer on the one hand, and the prospect of a large outlet for lignin on the other, caused enough interest to lead to the establishment of a cooperative project of the Research and Development Division of Polymer Corporation, Limited, Sarnia, and of Howard Smith Paper Mills Limited in Cornwall. Howard Smith Paper Mills undertook the development of a suitably modified lignin and the laboratory preparation of masterbatches, which were compounded and evaluated by Polymer Research and Development Division.

In nearly all cases masterbatches were prepared by dissolving the lignin in sodium hydroxide, mixing the lignin solution with GR-S latex in the ratio of two parts GR-S solids to one part of lignin, heating the mixture to 95°C., and slowly precipitating under mild stirring with a solution containing sulfuric acid and sodium chloride in equal amounts at a pH of 2.5. The slurry showed a high filtering speed and could be washed and dried very easily.

When using the alkali lignin from aspen wood (soda lignin), as manufactured in the previously described manner for molding purposes, the rubber showed only moderate reinforcement. Similar disappointing results were obtained with lignin from coniferous wood (kraft lignin).

Modification of the previously described precipitation method, such as changing the order in which the reactants were added, or lowering the precipitation temperature, which gave finer particles, did not improve the strength properties of the masterbatch.

However, since the reinforcement due to these lignins, though inferior to that obtainable with EPC black, was still superior to the reinforcement which could be obtained with any other pigment or filler, it was felt that these lignins could possibly be modified in such a way as to improve their reinforcing properties.

Results with Oxidized Lignins

Carbon black is a compound, neither melting nor fusible, and of low chemical reactivity as such, but of large surface area. It was felt that the lignin which was used for the first reinforcing tests and which, for molding purposes had to be low melting and readily fusible, might not have been the right choice. It was remembered that lignins which were prepared under oxidizing conditions had poor or no flow, and were high melting or infusible.

Such an oxidation may be carried out by bubbling air through an aqueous solution of lignin acid salt or lignin sodium salt or in other ways, such as by purposely oxidizing the black liquor prior to or during its precipitation treatment or by oxidizing the lignin acid salt in dry powdered form in a current of hot air or oxygen. This may be carried out with or without catalysts or through the use of specific oxidizing agents. The oxidative treatment, preferably done in a lignin solution maintained at a pH of around 10 by the occasional addition of caustic, should be continued until the melting point of the modified lignin, after acid precipitation and drying, is at least 240°C. Concomitant with oxidation is a decrease in the methoxyl content and an increase in the viscosity of non-aqueous solutions, and for any given initial lignin, this property may be used besides the melting point as an index of adequate oxidation.

As an example, oxidation of lignin in alkaline solution at 60-70°C. with air, changed its characteristics as shown in Table I. Tne influence of oxidation in raising the melting point and viscosity and in lowering the methoxyl content can be seen. This latter is not evident in the coniferous kraft lignin.

When these oxidized lignins were co-precipitated with GR-S latex, compounded, cured and vulcanized, rubbers were obtained with tensile strengths actually comparable to the EPC black-reinforced product. The compounding recipe and the test results are shown in Table II. As can be seen by the tensile strength, oxidation of the lignin substantially improves its reinforcing value.

The co-precipitation technique was further developed in the pilot plant of the Research and Development

Table II—Physical Properties of 50 Part Lignin Masterbatches

(Cured to optimum at 292° F.; GR-S = 100)

Lignin masterbatch	150.0
Circosol 2XH	5.0
Zinc oxide	5.0
Altax	1.5
Cumate	0.1
Sulfur	4.0

	Tensile at Break (p.s.i.)	Elong. at Break (%)	Modulus at 300% (p.s.i.)
Original soda lignin from aspen wood	2230	730	550
Oxidized soda lignin from aspen wood	3050	630	900
Original kraft lignin from coniferous wood	2190	630	890
Oxidized kraft lignin from coniferous wood	3100	680	995
EPC black (ORR recipe)	3200	660	980

TABLE III—COMPOUNDING RECIPES

(GR-S = 100)

	A	B
Lignin masterbatch	—	150
GR-S	100	—
EPC Black	50	—
Circosol 2XH	5	5
Stearic acid	—	2
Zinc oxide	10	10
Titanium oxide	25	25
Red iron oxide	10	10
Altax	1.5	1.5
Cumate	—	0.1
Sulfur	2	4

Note: Similar recipe used for other loadings, except that accelerator adjustments were made.

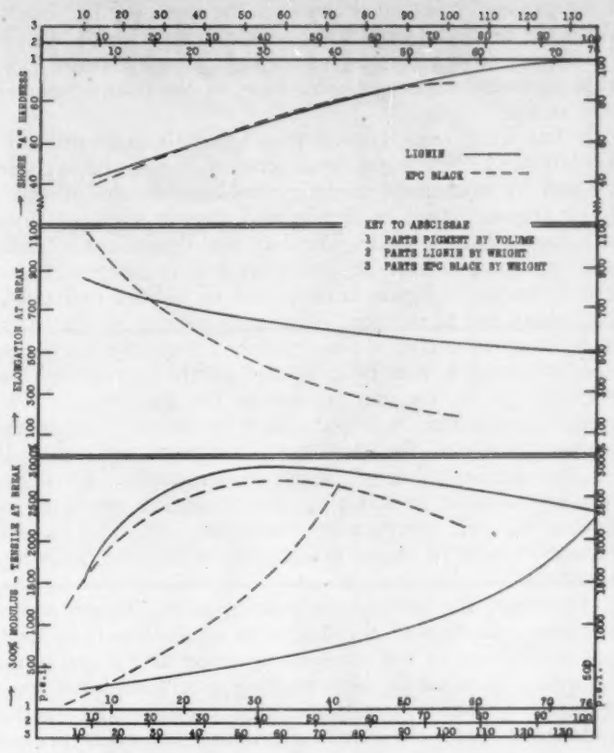


FIG. 1—Comparison of physical properties of compounded rubbers of varying lignin and EPC contents. (See Table III for compounding recipes).

Division of Polymer Corporation until a continuous coagulation technique is now available that can be adapted to production scale operations.

Lignin masterbatches, with lignin content varying from 10 parts to 150 parts by weight per 100 parts GR-S, were prepared and evaluated in a recipe which gave an attractive red shade. These exhibit properties and tensile strengths better than were obtained from equivalent loadings of EPC black mill-mixed in the same recipe.

The compounding recipes are shown in Table III. The compounds were cured to optimum, using as the criterion the point of maximum tensile strength on the stress-time of cure curve. The test values are shown in Figure 1. In order to obtain a logical comparison, the lignin and carbon black contents are plotted on a volume basis, and the parts by weight are also indicated.

It will be noted that tensile values are superior with elongations higher and moduli lower for the lignin masterbatches. Hardness values are equivalent for equivalent volume loadings. It appears that compounds containing EPC black as reinforcing agent suffer larger losses in tensile strength upon the addition of fillers than do compounds reinforced with lignin. As a result, although carbon black compounded in the standard tread recipe shows reinforcing properties superior to lignin, the recipes containing fillers or coloring agents show lignin to be superior. This becomes pronounced in very high loadings as will be shown later.

Other data are available to show that lignin masterbatches are equivalent to GR-S compounded with EPC black in high temperature properties, and superior in sunlight and ozone cracking and in tear resistance. In the latter property, lignin masterbatches lie midway between GR-S compounded with EPC black and natural rubber compounded with EPC black.

Lignin compounds are slower curing due to the chemical nature of lignin. Sulfur ratios should be calculated on the basis that lignin requires the same amount of sulfur as does the rubber hydrocarbon or slightly more. With this modification, little change is necessary in accelerator levels in factory recipes. The lignin compounds process very smoothly.

Lignin masterbatches may be diluted with GR-S to secure lower loadings and retain desirable physical properties, as is shown in Table IV. Considering the state of development of the project, the difference in properties between the diluted masterbatches and those made directly to the desired levels is probably not significant.

Lignin masterbatches may be compounded with large amounts of low-cost fillers and still retain good physical properties, as indicated in Table V. It was not found possible to compound GR-S containing 50 parts EPC black with as high a loading of other pigments and fillers.

It appears that oxidized lignin can be used in a variety of rubber compounds to give properties equivalent to

TABLE IV—PROPERTIES OF A 50 PART LIGNIN MASTERBATCH DILUTED WITH GR-S TO LOWER LOADINGS, COMPARED TO THE PROPERTIES OF THE MASTERBATCH MADE DIRECTLY

(Recipe same as in Table III)

Parts per 100 lbs. GR-S as made	10	—	15	—	20	—	30	—
Parts per 100 lbs. GR-S as diluted	—	10	—	15	—	20	—	30
Tensile at break, p.s.i.	1660	2000	1800	2180	2020	2370	2880	2880
Elongation at break, %	780	820	790	700	750	760	700	750
Modulus at 300%, p.s.i.	260	250	300	370	340	370	780	480
Hardness, Shore A	44	45	44	50	52	50	76	63
Compound Mooney, ML/4'	39	38	42	44	47	48	104	60

those presently obtained through the use of EPC black. With the addition of white pigments, a range of shades from grey to black is possible, and the addition of colored pigments makes possible most of the colored shades now in use.

It has long been known that lignin is susceptible to oxidation. Degradation products of lignin have been studied by numerous investigators as a means of clarifying the structure of lignin and also in view of their possible economic value. The fact that lignin can actually take up oxygen can be demonstrated in several ways. For example, if lignin is dissolved in sodium hydroxide and subjected to oxygen, in a setup similar to that used in hydrogenation, at approximately 70°C., the consumption of oxygen can be followed quantitatively by the decrease in the oxygen volume in the gas burette. The oxygen consumption is paralleled by an increase in the melting point of the thus treated sample, and the pH of the lignin solution decreases gradually. This has proven valuable in studying the oxidation reaction, influence of pH, temperature, catalysts, etc. The experimental results of these investigations will be published shortly.

However, the increase in melting point, though a convenient indication of the degree of oxidation, is in itself not a criterion of the reinforcing value of a given lignin sample. For example, high melting or non-melting lignin samples, prepared by chlorinating lignin under certain conditions, show no improvement in reinforcing properties in rubber.

Oxidized lignins show increased lyophyllic properties. Their solutions in cellosolve and their alkaline salts in water have higher viscosities than those of the unoxidized product. To precipitate filterable lignin from alkaline solutions, higher temperatures are required for oxidized than for unoxidized lignins (90-95°C., against 80-85°C.), and the higher oxidized lignin cake shows a higher degree of shrinkage.

Theoretical Aspects

Much work has been devoted by numerous investigators to the study of the role of carbon in rubbers. Various tests have been worked out for the evaluation of different types of carbon black. The pH, the surface and the structure of the carbon were found to be important factors, surface being generally the dominating influence. The disposition of reinforcing carbon particles in rubber is another important problem. Absorption measurements and methods to determine the micromorphology of carbon black as well as of the ultimate carbon-polymer unit have been carried out, and particuarly the electron microscope analysis has proven to be a most valuable tool.

Similar leads will have to be followed in the study and evaluation of oxidized lignins. It may well be found that the improved reinforcing properties obtained by oxidation are due to some burning out effect on the lignin molecule, causing changes in the surface and microstructure, probably accompanied by chemical changes.

All in all, it is felt that the development work on the oxidation of lignin has not only provided the rubber industry with a product of lower density which can be used as an alternate to carbon black, with the further possibility of manufacturing bright-colored articles of similar physical properties as those of black rubber, but it also promises to open up a large field for the use of lignin to the Canadian pulp and paper industry. Comparative studies on lignins, unoxidized as well as oxidized to varying degrees, similar to those carried out on carbon black, may well throw further light on the puzzle of rubber reinforcement and, last but not least, on the structure of lignin itself.

TABLE V—HIGH FILLER LOADINGS COMPOUNDED IN 50 PART LIGNIN MASTERBATCH

(Rubber hydrocarbon content, 15%)

Lignin Masterbatch	150	
Circosol 2XH	50	
Stearic acid	2	
Zinc oxide	10	
Suprex clay	430	
Altax	2	
Cumate	0.3	
Sulfur	6	
Physical Properties		
Cure time at 292°F. min.	50	80
Tensile at break, p.s.i.	1242	1320
Elongation at break, %	100	70
Hardness, Shore A	85	88
Set, 10 min. after break, %	10	5
Abrasion index, Bureau of Standards, %	14.3	—

A new low cost, high-lift **Worksaver electric pallet truck** has been introduced by the Yale & Towne Manufacturing Co., Philadelphia, Penna. This new truck has a 2,500-pound capacity, is 39 by 31 inches in over-all dimensions (not including the forks), and lifts pallets 66 inches for overhead tiering. The mast is 83 inches high and permits the truck readily to enter such low head room spaces as street trucks and freight cars.

A new line of **manual starting switches** for use with fractional h.p. motors has been introduced by the Control Division, General Electric Co., Schenectady, N. Y. The new switches are available in five different types: with general-purpose enclosure; without enclosure; a combination unit and selector switch; with cast iron enclosure for wet locations, and a similar type for dusty or hazardous locations.

A new automatic parts washer which offers complete fire protection in the use of flammable cleansing solvents has been introduced by the Protectoseal Co., Chicago 8, Ill. Called the **Air-Matic Parts Washer,** it is compact and portable and can be set up alongside production machines. Washing of parts is achieved by moving the perforated basket, with contents, up and down through the solvent, and not by forcing air into the solvent which often creates dangerous vapors.

Industrial Heating Division, General Electric Co., Schenectady, N. Y., has developed a new **3-kw, 40-megacycle preheater** for rapid and uniform preheating of plastic preforms. Operating on 230 volts, single phase, 60 cycles, the new preheater will heat 40 ounces of wood flour phenolic compound from 70° F. to 250° F. in one minute, or one pound of this material in 24 seconds.

Reclaimed Rubber Today Versus Prewar

By ALVIN FUHRMANN and ROBERT L. RANDALL

Midwest Rubber Reclaiming Co., East St. Louis, Ill.

WHEN it became necessary for our country to produce GR-S and use this new form of elastomer, the manufacturers of reclaimed rubber in common with other members of the rubber industry faced the problem of processing a new material. There was, of course, a time lag for the reclaiming industry because tires based on GR-S were not available in any quantity until 1944. Since that time there has been a wide swing in consumption ratios of natural rubber and GR-S as indicated by Table I. The data are plotted in Fig 1.

Table I—United States Consumption Ratios

Year	Natural Rubber	GR-S
1943	71	29
1944	23	77
1945	15	85
1946	30	70
1947	56	44
1948 (to date)	65	35

Question of Uniformity

Scrap tires comprise the raw material base for about 85% of the reclaimed rubber produced in this country. While the wide range given in Table I covers the entire rubber industry, these ratios were primarily the result of usage in tires. The point most frequently raised by those responsible for rubber compound development has been the question of how a uniform reclaim could be produced out of raw material containing such an extreme mixture of elastomers.

Initial work was done on the S-3 passenger tire which was based essentially on GR-S. The resultant reclaim was first used in tire carcass compounds. Physical properties inherent in GR-S such as lack of building tack were carried over in the reclaim. However, there were several advantages which established this material as an important new compounding ingredient. Processability of GR-S and S-3 tire reclaim blends was excellent. Sticking to mill and calender rolls which was characteristic of blends of GR-S and natural rubber reclaim was eliminated. This processing advantage which permitted higher speeds was particularly apparent on the four roll calender. There was also a secondary advantage in that straight GR-S reclaim showed better aging than the prewar material.

With the elimination of tire construction markings followed by changes in elastomer ratios, it was soon evident that methods of reclaiming such mixtures had to be developed. This program started with identification tests and subsequent processing of known mixtures. This experience led the way to the present procedure of processing either giant or passenger run of mine tire scrap. Identification tests have been practically eliminated. Comparative analyses of reclaims which are typical of this development are given in Table II.

The outstanding differences between the pre-war natural rubber whole tire reclaim and the S-3 product first introduced in 1944 are higher acetone extract, higher carbon black, lower ash and lower rubber content for the GR-S material. The higher acetone extract of the reclaim was the result of three factors: (1) Higher acetone extract of GR-S, (2) The use of increased softener in GR-S tire compounds, and (3) The use of higher devulcanizing oil ratios required for GR-S digester reclamation.

Achievement of Uniformity

This trend has changed and today the resultant rubber content of a typical whole tire reclaim averages 52% compared to a pre-war average of 54%. More important, however, in present day technology is the fact that day to day processing of mixed tires yields a reclaim remarkably uniform in physical characteristics. It has been found through repeated analyses of the rubber content

Note: This paper was presented before the meeting of the Division of Rubber Chemistry, A.C.S., at Los Angeles, Calif., July 22-23, 1948.

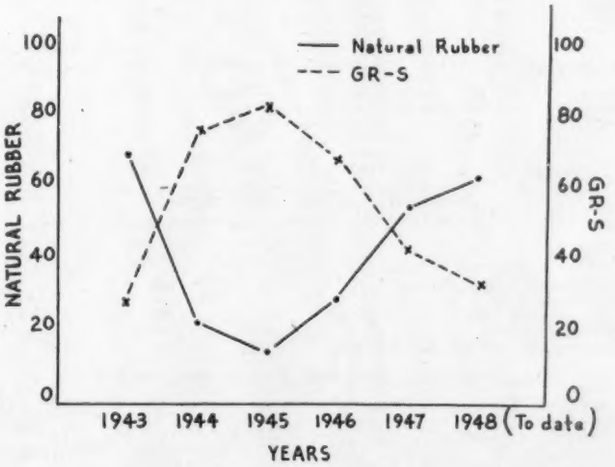


Figure 1

Table II—Typical Reclaim Analyses

	Prewar Whole Tire	S-3 Whole Tire	Present Mixed Tire	Present Mixed Peel
Specific Gravity	1.19	1.16	1.17	1.19
Acetone Extract	11.%	24.%	17.%	16.%
Chloroform Extract	1.	1.	1.	1.
Ash	16.	8.	10.	11.
Cellulose	Nil	Nil	Nil	Nil
Carbon Black	17.	19.	18.	22.
RHC—Difference	54.	46.	52.	49.

TABLE III—COMPARISON IN A PASSENGER TIRE CARCASS COMPOUND

Tensile Properties Before Aging

Compound	Cure at 287° F.	Modulus 300%	Tensile	Elong.	Shore Hardness	Crescent Tear
Prewar Whole Tire	15′	610	1520	570	51	140
	30	730	1590	520	53	80
	45	770	1495	490	55	80
	60	755	1455	480	56	95
	75	715	1325	480	58	65
Average		750	1510	500	55	85
Present Mixed Tire	15′	445	1390	630	51	120
	30	705	1715	570	53	150
	45	780	1685	510	55	100
	60	785	1560	500	56	90
	75	800	1545	490	58	85
Average		755	1650	525	55	110

Note: 30′—45′—60′ cures taken for average

Tensile Properties After Oven Aging 48 Hours @ 212° F.

Compound	Cure at 287° F.	Tensile	Elong.	Shore Hardness	Crescent Tear
Prewar Whole Tire	30′	1205	290	64	65
	45	1165	290	65	60
	60	1150	290	64	70
Average		1170	290	64	65
Present Mixed Tire	30′	1200	290	65	65
	45	1105	280	66	70
	60	1090	280	65	70
Average		1130	285	65	70

Dynamic Properties Before Aging

	Prewar Whole Tire	Present Mixed Tire
Cut Growth Kilocycles/inch	720	1280
Heat Build Up:		
Temperature Rise	120° F.	122° F.
Permanent Set	10.6%	9.3%
Lupke Rebound	40%	40%

Dynamic Properties After Oven Aging 48 Hours @ 212° F.

Cut Growth Kilocycles/inch	16	10
Heat Build Up:		
Temperature Rise	117° F.	108° F.
Permanent Set	2.3%	1.6%
Lupke Rebound	36%	35%

that the ratios of natural rubber will range from 55 to 65% with the balance comprised of GR-S.

This uniformity is obtained by the blending influence of the following factors:

1. Scrap tires received at consuming mills cover a rather broad period of tire manufacture.
2. Processing is usually based on tire parts or run of mine tires which have been graded only for size and segregation of light colored natural rubber zinc carcass.
3. Most whole tire reclaim is digester processed which involves treatment of rather large quantities of scrap.

These factors act as levelers for what might otherwise result in spot variation.

The next logical and pertinent point raised by consumers of reclaimed rubber concerns future trend. If the tire industry continues to use the present elastomer ratios, the natural rubber content of tire reclaim rubber hydrocarbon will level off around 65% with the balance consisting of GR-S. Road tests of tire treads based on the new low temperature polymer indicate improvement of GR-S. This may hold or increase the present consumption ratio long after Public Law 469 has expired. In such event the reclaiming industry would be processing mixed elastomer tire scrap for years to come.

This paper, therefore, has as an objective the comparative evaluation of present day mixed tire reclaim with the prewar material in end products which are important to the industry. First comparison is made in the following representative passenger tire carcass compound:

PASSENGER TIRE CARCASS COMPOUND

Smoked Sheet	40
GR-S	20
Reclaim	80
HMF Black	20
Stearic Acid	1
Zinc Oxide	3
Soft Asphalt	8
Antioxidant	1
Sulfur	3
Mercaptobenzothiazole	0.625
	176.625

Dynamic and tensile properties before and after oven aging are shown in Table III. While curing rate in the initial stage of cure is slightly slower for the present day reclaim, there is no difference in the range of optimum cure. Both dynamic and tensile data indicate that the compound based on the present day material is fully equivalent or superior to the prewar product. There are also the same processing advantages observed in the use of S-3 tire reclaim.

Similar comparative tests have been run in a number of passenger tire carcass stocks with changing ratios of

TABLE IV—COMPARISON IN A PASSENGER TIRE UNDERTREAD COMPOUND

Tensile Properties Before Aging

Compound	Cure at 287° F.	Modulus 300%	Tensile	Elong.	Shore Hardness	Crescent Tear
Prewar Whole Tire	30′	1080	1620	450	64	140
	45	1180	1650	440	65	160
	60	1180	1680	430	66	150
	75	1120	1620	430	67	130
Average		1140	1640	435	66	145
Present Mixed Tire	30′	1000	1540	480	66	150
	45	1120	1660	440	67	140
	60	1170	1620	420	67	130
	75	1190	1610	420	68	130
Average		1120	1610	440	67	135
Present Mixed Peel	30′	990	1670	500	63	150
	45	1160	1750	450	65	130
	60	1170	1730	430	66	130
	75	1210	1710	430	67	120
Average		1130	1715	450	66	130

Tensile Properties After Oven Aging 48 Hours @ 212° F.

Compound	Cure at 287° F.	Tensile	Elong.	Shore Hardness	Crescent Tear
Prewar Whole Tire	30′	1480	240	75	80
	45	1530	280	74	100
	60	1510	290	73	100
	75	1480	290	73	90
Average		1500	275	74	90
Present Mixed Tire	30′	1590	280	75	90
	45	1640	290	74	110
	60	1680	310	73	100
	75	1610	330	73	110
Average		1630	300	74	100
Present Mixed Peel	30′	1700	270	73	100
	45	1730	280	73	90
	60	1670	300	73	90
	75	1620	310	72	100
Average		1680	290	73	95

Dynamic Properties Before Aging

	Prewar Whole Tire	Present Mixed Tire	Present Mixed Peel
Cut Growth Kilocycles/inch	105	100	90
Heat Build Up:			
Temperature Rise	190° F.	191° F.	176° F.
Permanent Set	21%	20%	16%
Abrasion Loss cc/HP Hr. DuPont	220	205	190

Dynamic Properties After Oven Aging 48 Hours @ 212° F.

Cut Growth Kilocycles/inch	21	17	21
Heat Build Up:			
Temperature Rise	131° F.	145° F.	136° F.
Permanent Set	2%	4%	2%
Abrasion Loss cc/HP Hr. DuPont	100	95	82

natural rubber, GR-S and reclaim. As in the case of the above compound, all data indicate that there is little difference between the two materials.

The next comparison is made in the following typical passenger tire undertread compound:

PASSENGER TIRE UNDERTREAD COMPOUND

GR-S	75
Reclaim	50
HMF Black	40
Clay	5
Stearic Acid	1
Zinc Oxide	5
Asphalt Softener	5
230° M.R.	5
Antioxidant	1
Sulfur	2
Benzothiazyl Sulfenamide	1
	190

Dynamic and tensile properties before and after oven aging are shown in Table IV. The two grades of tire reclaim are equivalent. However, the data indicate slight superiority for the present day mixed peel reclaim both before and after oven aging.

To typify mechanical goods compounding, comparison is made in the following black heel test compound:

BLACK HEEL TEST COMPOUND

GR-S	40.0
Reclaim	120.0
EPC Black	40.0
MR 300 F	10.0
Asphalt Oil	10.0
Zinc Oxide	3.0
Stearic Acid	2.0
Sulfur	3.5
Benzothiazyl Sulfenamide	1.0
DPG	0.3
	229.8

Physical properties before and after oven aging as shown in Table V indicate slight superiority for the present day material.

TABLE V—COMPARISON IN A BLACK HEEL TEST COMPOUND

Physical Properties Before Aging

Compound	Cure at 320° F.	Modulus 300%	Tensile	Elong.	Shore Hardness	Crescent Tear
Prewar	4′	640	1270	570	61	225
Whole	8	840	1390	465	63	210
Tire	12	810	1450	500	64	220
	16	820	1350	470	65	210
Average	8′-12′-16′	815	1400	485	64	215
	Bureau of Standards Abrasion Index 12′ Cure = 34					
Present	4′	340	550	490	58	90
Mixed	8	630	1210	535	60	190
Tire	12	840	1450	495	63	220
	16	910	1540	480	65	225
Average	8′-12′-16′	875	1495	485	64	220
	Bureau of Standards Abrasion Index 12′ Cure = 45					

Physical Properties After Oven Aging 48 Hours @ 212° F.

Compound	Cure at 320° F.	Tensile	Elong.	Shore Hardness	Crescent Tear
Prewar	4′	1090	270	72	150
Whole	8	1130	260	73	135
Tire	12	1190	270	74	140
	16	1220	270	73	135
Average	8′-12′-16′	1205	270	73	135
Present	4′	1080	230	73	160
Mixed	8	1270	230	75	130
Tire	12	1370	240	76	120
	16	1320	240	76	130
Average	8′-12′-16′	1345	240	76	125

TABLE VI—COMPARISON IN AN AUTOMOTIVE MAT TEST COMPOUND

Physical Properties Before Aging

Compound	Cure at 310° F.	Modulus 100%	Tensile	Elong.	Shore Hardness	Crescent Tear
Prewar	5′	345	710	390	74	90
Whole	10	345	690	360	74	80
Tire	15	335	690	355	74	80
Average	10′-15′	340	690	360	74	80
	Bureau of Standards Abrasion Index 10′ Cure = 11					
Present	5′	215	565	445	74	85
Mixed	10	325	680	365	74	80
Tire	15	335	700	370	76	80
Average	10′-15′	330	690	365	75	80
	Bureau of Standards Abrasion Index 10′ Cure = 11					

Physical Properties After Oven Aging 70 Hours @ 158° F.

Compound	Cure at 310° F.	Modulus 100%	Tensile	Elong.	Shore Hardness	Crescent Tear
Prewar	5′	605	860	230	80	95
Whole	10	635	820	230	82	100
Tire	15	585	800	230	82	100
Average	10′-15′	610	810	230	82	100
Present	5′	380	695	340	75	90
Mixed	10	475	795	310	78	95
Tire	15	485	795	290	80	105
Average	10′-15′	480	795	300	79	100

The automotive floor mat has long been an important end product for reclaim. A typical test compound follows:

AUTOMOTIVE MAT TEST COMPOUND

Reclaim	200.0
Clay	100.0
Whiting	50.0
MR 300 F	15.0
Asphalt Oil	20.0
Zinc Oxide	3.0
Stearic Acid	2.0
Sulfur	4.0
Mercaptobenzothiazole	1.5
DPG	0.5
	396.0

Physical properties before and after oven aging are given in Table VI. The data indicate comparable quality for the two reclaims. However, there is a processing characteristic of the present day mixed tire reclaim which has been improved. This concerns increased resistance to hot tear of the uncured stock.

The last comparison is based on modified whole tire reclaims of the type used in low cost hard rubber compounding. Comparative analyses are shown in Table VII. A test compound typical of hard rubber storage battery container practice follows:

HARD RUBBER TEST COMPOUND

Reclaim	220
Soft Clay	185
Wood Flour	10
Hard Rubber Dust	15
Asphalt Oil	25
Sulfur	40
Lime	5
	500

This particular end product has entailed a longer development program than has been required for soft rubber. Neutral reclaims act differently in a hard rubber cure than the prewar alkali types. This is true whether the rubber hydrocarbon is based on straight natural rubber or mixtures of natural rubber and GR-S. However, the test data as indicated in Table VIII show physical properties have been attained which are a close

TABLE VII—MODIFIED TIRE RECLAIM ANALYSES

	Prewar Natural Rubber	Present Natural and GR-S
Specific Gravity	1.24	1.24
Acetone Extract	14.%	17.%
Chloroform Extract ..	2.	1.
Ash	19.	18.
Cellulose	7.	1.
Carbon Black	10.	15.
RHC—Difference	46.	46.

TABLE VIII—PHYSICAL PROPERTIES

Compound	Cure at 340° F.	Tensile	Elong.	Shore D Hardness	Impact Strength Ft.Lbs./ Sq. Inch
Prewar	10′	1850	8.0	75-70	2.40
Natural	12	2150	5.1	79-75	1.70
Rubber	14	2550	3.0	82-79	1.55
	—	—	—	—	—
	Average	2185	5.4	79-75	1.88
Present	10′	1760	5.1	78-74	2.60
Natural	12	1890	3.8	80-76	1.80
and GR-S	14	2555	2.7	82-79	1.45
	—	—	—	—	—
	Average	2070	3.9	80-76	1.95

Note: All data obtained on ¼" thick test slabs.

match for the prewar reclaim. Rate of cure has in fact been increased and the important characteristic of impact strength has been maintained.

The prewar natural rubber tire and the resultant reclaim were the products of long experience. As a result of war, a generation of rubber technology has been compressed into a few years. Intensive work has been done and on the basis of both laboratory data and end product tests, new grades of reclaim are now available which equal or exceed prewar quality.

No one company or individual has been alone in this development program. The problem of obtaining further improvement is common to the entire industry. While different paths will be followed, every manufacturer of reclaim has the same objective of providing uniform materials while constantly improving quality.

As in the case of tires, standing on prewar quality will not be enough. New reclaims which must meet more stringent processing and service requirements are being requested by the rubber industry.

For example, tire manufacturers having attained the goal of faster processing are now requesting grades of reclaim which will take a shorter Banbury cycle, provide greater flexibility in the use of compound softeners and also possess increased tack.

Mechanical goods manufacturers are asking for smoother extrusion, higher tensile properties and improved resistance to sun checking and staining.

In automotive mat production, processing problems have been made more difficult by deeper contours necessitated by new car designs which call for a lower center of gravity. This means that the flow of uncured stock must conform to the contour of the mold without tearing.

Hard rubber storage battery containers face the trend of reduced wall thickness in order to meet engineering demands for reduction of space and weight. This will compel increased impact resistance and less distortion to temperatures encountered in under hood service.

The reclaiming industry has provided new and valuable compounding ingredients to meet present day requirements, and development work aimed at meeting ever changing demands of the future will continue.

Report on Radio-Active Static Eliminator Bars

THE Health Committee of the Rubber Section of the National Safety Council was recently assigned the problem of investigating any possible health exposure to industrial employees in the rubber industry as the result of the use of radio-active bars for static elimination. The committee has reviewed a large part of the available literature on the physiological effects of exposure to alpha, beta and gamma radiation. In addition, members of the committee have personally been in touch with the manufacturers of both the radium and the polonium bars, and have reviewed the informational bulletins prepared by these manufacturers. The committee has also made a survey of some of the larger rubber manufacturers to determine whether any health problem has developed as the result of the development of radio-active static eliminators.

At the present time there is rather general agreement that exposure to gamma radiation should be kept below 100 milliroentgens per day. Because of the lack of sufficient data regarding the effects of exposure to beta radiation, there have been some differences of opinion as to its tolerance dose. It is suggested, pending further work on beta radiation, that a standard of 100 Mrep. (Milliroentgens equivalent physical) per day be used tentatively. Alpha radiation has an extremely short range in air, varying from one to three inches and is stopped by very thin films of material, as a sheet of writing paper. High concentrations falling on the skin can produce a skin burn.

It is the opinion of the committee on the basis of available information that the radium bar, which emits alpha, beta and gamma radiation, can be used with safety provided that the exposure to either beta and gamma radiation is kept below the limits mentioned above, and provided further that the instructions of the manufacturer contained in their bulletin *General Information Regarding Functioning, Installation and Maintenance of Ionotron Static Eliminators* are carefully followed.

The committee considers that the polonium-type bar, which is a pure alpha emitter, can be used with safety provided that actual contact with the skin be avoided, and provided that rubber gloves be used when cleaning or handling the bar.

The committee further recommends that any manufacturer considering the installation of radio-active bars for static elimination, obtain and review the article "Evaluation of the Beta and Gamma Radiation Due to Extended Linear Sources of Radium" by Robley D. Evans, *Journal of Industrial Hygiene and Toxicology*, Volume 28, No. 6, page 243 (1946).

Editorials . . . . . .

Division Meetings

FOR MANY YEARS it has been the practice of the Division of Rubber Chemistry of the American Chemical Society to hold two meetings a year. This year three meetings were held—Chicago, Los Angeles and Detroit. The Los Angeles meeting, however, was more-or-less in the form of an experiment, and is not likely to be repeated in the near future except as the site for a regional rather than a full Division meeting.

In recent years some members of the Division have questioned the necessity of holding meetings semi-annually and have indicated a preference for a single meeting only. Maintaining that a three or four day session once a year would be sufficient to meet the aims and purposes of the Rubber Division, those expressing this sentiment argue that such a meeting would (a) permit the presentation of better quality technical papers, (b) attract a larger attendance, and (c) result in substantial savings. The reasoning behind these conclusions runs along the following lines:

The major aim of the Rubber Division is to disseminate technical information on the subject of rubber chemistry. This is largely achieved by the presentation of technical papers at the scheduled meetings, and the subsequent publication of these papers. At present, between 20 and 35 papers are presented at each of the semi-annual meetings. The Papers Committee is sometimes hard pressed to secure sufficient papers to occupy the sessions alloted to the Division, with the result that a few weeks before the deadline pressure is brought to bear on companies to prepare papers for a given session. The value of such papers, secured under such conditions, is sometimes questionable. Slides are rushed through, and fall far short of conveying specific messages, to say nothing of their appearance when projected. Were meetings held but once a year the chances for higher quality papers and slides would be substantially improved.

Under present regulations authors of intended papers need present abstracts only of such papers to the committee by specified deadlines. It is not always possible to determine the quality of paper from its prepared-in-advance abstract. It will be recalled that during the first several years of its existence Division regulations called for submission of complete papers by specified deadlines and acceptance of papers for presentation rested with a special Papers Review Committee. Screening of papers in this manner was assurance of presentation of quality material only. If meetings were held on an annual basis only, a committee of this kind could be revived and the members given ample time to screen all papers.

Greater use could be made of the facilities of local rubber groups to bring before the industry any major developments which occur between annual meetings of the Division. Many will recall that the first public announcement of neoprene (than called DuPrene) was made at a meeting of the Akron Rubber Group. In this sense, once-a-year Division meetings would result in more technical sessions held by the local groups.

Proponents of a single annual Division meeting also argue that attendance, which now averages about 650 at each of the semi-annual meetings, would reach approximately 1,000. Sending technical men to these sessions is becoming increasingly costly and most rubber manufacturers are watching cost figures closely these days. A once-a-year meeting would be a "must" for most chemists with a resulting increase in the attendance figures.

Those favoring the single meeting idea are aware of the by-laws of the American Chemical Society which specify that a subject division must meet with the parent society at least once a year. The idea of meeting with the parent society is a good one, but circumstances alter cases and perhaps modification of the A.C.S. regulation on this score is called for.

There is still another point made for once-a-year meetings, although not having any direct bearing on Rubber Division activities, namely, the suppliers' cooperative cocktail party, which has proved so popular at the last several meetings. These parties are independent affairs, but nevertheless contribute substantially to the success of each meeting. For the most part, suppliers are in definite agreement as to the desirability of holding the cooperative venture. It enables the entire Division membership to congregate for an hour or so of social contact. It creates general good-fellowship. It eliminates efforts of trying to outdo the other fellow with grand style entertainment. And it is definitely a saving in cost. However, even a cooperative venture of this kind on a twice-a-year basis is expensive, and if it were held at an annual meeting only it would have the support of most suppliers in the field.

The above paragraphs briefly cover the claims of those favoring a single Division meeting a year. Much can undoubtedly be said for maintaining the present status quo of semi-annual meetings, but since this is the first time the subject has been brought into the open there has been no reason for those favoring the present system to defend their convictions. It is hoped, therefore, that those having definite ideas on the question—both pro and con—will write to the editor so that the feeling of the industry can be determined and brought to the attention of the proper authorities. What is your opinion?

CURRENT NEWS OF THE MONTH

ACS CHICAGO SECTION SPONSORS NATIONAL CHEMICAL EXPOSITION

The 1948 National Chemical Exposition, held in the Coliseum, Chicago, Ill., was the largest in the number of exhibits of the five biennial shows sponsored since 1940 by the Chicago Section of the American Chemical Society. The show ran for five days from October 12 to 16. Admission was limited to representatives of the chemical and allied industries. There were 201 exhibitors.

Among other highlights were the facilities provided to aid manufacturers and business men seeking a solution of their production problems through the use of chemistry. Many availed themselves of the opportunity afforded to get authoritative information. The maintenance of a 'Technical Bureau" made this possible. It was manned by Dr. Ward V. Evans, retired chairman of the chemistry department of Northwestern University, and now professor of chemistry at Loyola Universtiy, Chicago.

Among the papers which were presented at the exposition was a talk on 'Science and the Future," presented by Dr. E. R. Weidlein, director of the Mellon Institute. Bruce Brown, president of the Standard Oil Co. of Indiana, spoke on the interrelation of the petroleum and the organic chemical industry.

Some features of interest in an exhibit sponsored by the Department of Agriculture were displays of low-grade cotton materials, chemically-treated to look and wear like linen; cotton fabrics which had been treated to resist rot and decay; and an automobile tire which had been driven at 60 miles per hour for nearly 70,000 miles in official Army Ordnance tests. It is believed that the use of carefully selected varieties of cotton for the manufacture of cords, such as were used in this tire, will add to the service and mileage obtainable from casings.

The use of waste products for resins, turpentine, pine oil and insecticides has proved successful, judging from the results obtained by one exhibitor. These are derived from stumps of southern pine. Also on exhibit were chemical cotton and cellulose acetates for use in plastics manufacture. These had been derived from a poor grade of cotton linters, heretofore considered useful only for fertilizer.

Highlight of the National Industrial Chemical Conference was the dinner meeting, held on October 14, at which Dr. Charles Allen Thomas, president of the American Chemical Society, was the principal speaker. In his address, Dr. Thomas emphasized as reasons for the phenomenal growth and development of America, the wide application of science and its methods, and the country's favorable social environment. He pointed out that we have been very fortunate in that our country's founders recognized liberty as essential to man's continual aspiration toward his ultimate goal.

Much of the success of the show was attributed to the efforts of officials of the Chicago Section of the American Chemical Society.

Walking Test for Soles

Results of an interesting walking test, conducted in Washington, D. C., to compare the relative merits of two types of shoe soles, leather and Neolite, have been announced by the Goodyear Tire & Rubber Co. Six high school and college students were employed by Goodyear to walk five to twenty miles daily on the streets of the nation's capital. The hikers averaged 300 miles each over a period of 23 days, in order to compare the effects of Neolite and conventional leather shoe soles, particularly from the standpoint of foot health. The walking tests were conducted under the auspices of the Clinical Research Division of the National Association of Chiropodists. It was found that no harmful effects resulted from wearing either Neolite or leather. Neolite, however, gave approximately 100% more mileage than the average leather sole. It was also determined that a person's height and weight have no standard effect on shoe life. Many small-type persons wear out a pair of shoes twice as fast as a six-foot heavyweight.

Coated Fabrics Plant Closes

The coated fabrics plant of the Atlas Powder Co. at Stamford, Conn., will be closed down as soon as current sales orders are filled, Isaac Fogg, president of the company, announced recently. It is expected that production will cease before the end of November. Mr. Fogg said that the action is being taken due to the unsatisfactory conditions in the coated fabrics industry, the substantial losses in these products and the unsatisfactory outlook for the future. Negotiations are now in progress for the sale of the real estate and equipment. The manufacture and sale of industrial finishes at Stamford and North Chicago, Ill., and of Revolite laundry rolls and press covers at Stamford will be continued.

TIRE PRODUCERS FINED $50,000 AFTER NOLO CONTENDERE PLEA

Fines totaling $50,000 were imposed by Federal Judge John C. Knox of the U. S. District Court of New York on October 21 on eight tire manufacturers, the Rubber Manufacturers Association, and two of its officers after their plea of nolo contendere to a criminal information charging violation of the Sherman Anti-Trust Act.

The defendants were charged in the information, filed in March, 1947, with conspiring to agree on prices, discounts, allowances, bonuses and other related practices for the purpose of eliminating competition in the sale and distribution of tires. Trial was to begin early next year.

Judge Knox imposed a fine of $5,000 on the association and $2,500 each on A. L. Viles, its president, and George Flint, assistant secretary. The following were fined $5,000 each: Dayton Rubber Company, Dayton, Ohio; Lee Rubber and Tire Company, Conshohocken, Pa.; United States Rubber Company, New York, and Firestone Tire and Rubber Company, General Tire and Rubber Company, B. F. Goodrich Company, Goodyear Tire and Rubber Company and Seiberling Rubber Company, all of Akron, Ohio.

J. Francis Hayden, special assistant Attorney General in charge of New York office of the anti-trust division, said the Government had dropped charges against the following: J. L. Cochrun, vice president of Seiberling; I. Eisbrouch, vice president of Dayton Rubber; A. A. Garthwaite, president of Lee Rubber; H. N. Hawkes, assistant general manager of United States Rubber; Lee R. Jackson, executive vice president of Firestone; L. A. McQueen, vice president of General Tire; J. J. Newman, vice president of B. F. Goodrich, and R. S. Wilson, vice president of Goodyear.

Acquires Plastics Institute

The West Coast University, of Los Angeles, Calif., has acquired the laboratories and the training facilities of the Plastics Industries Technical Institute, 1609 South Western Avenue, Los Angeles, Calif. West Coast has retained the staff of the Plastics Institute and will offer courses in plastics technology on three levels. These include a nine semester course in mechanical engineering with specialization in plastics processing, leading to the degree of bachelor of science; an intensive four-month course in plastics fabrication for resident students; and a one-year home study course for up-grading plastics industry personnel, or as preparation for employment in the industry.

TWO TALKS FEATURE MEETING OF NEW YORK RUBBER GROUP

Two interesting talks featured the Fall Meeting of the New York Rubber Group, held on October 15 at the Henry Hudson Hotel in New York City. The talks were "GR-S Achieves Major Advance in Performance," by Dr. William F. Tuley, Operations Manager, Naugatuck Chemical Division, U. S. Rubber Co., and "Palletizing of Raw Materials for the Rubber Industry," by William T. Donahue, of the Addison-Semmes Corp., Racine, Wis. Approximately 300 members and guests were in attendance.

Dr. Tuley briefly reviewed the progress made by GR-S to date and then launched into a discussion of the new low temperature polymers, emphasizing the qualities which have been substantially improved in carbon blacks stocks made with the new polymers and outlining some important properties which have not yet been improved to any great degree. Among the latter he listed tensile strength of non-black compounds, hysteresis or heat build-up, stiffening at low temperatures, atmospheric cracking, and tackiness of raw stocks.

A considerable portion of the talk was devoted to the effects of low temperature polymerization on the composition of the polymer. In this connection, the speaker stated that there is evidence that as the polymerization temperature is decreased, the structure of GR-S becomes more regular although it does not approach that of natural rubber. Faint but definite X-ray patterns have been secured which indicate increasing regularity, especially with high butadiene polymers formed at sub-freezing temperatures.

Pointing out that tests have proved the low temperature polymers will give tire treads with 30% longer wear than natural rubber treads, Dr. Tuley also predicted widespread use of these polymers in footwear, wire insulation and mechanical goods in general. He also pointed out that manufacturers of non-transportation products already are using 25 to 30% of all GR-S consumed on a voluntary basis.

In concluding his talk, Dr. Tuley forecast that low temperature GR-S will displace present standard types of GR-S as rapidly as it is made available, that demand for low temperature GR-S will probably exceed supply for the next 12 to 18 months, and that consumers will benefit from better performance through the use of such GR-S. (EDITOR'S NOTE: Dr. Tuley's paper is published in full elsewhere in this issue.)

The talk on "Palletizing of Raw Materials" by Mr. Donahue, the second speaker, was received with a good deal of interest. Mr. Donahue first described the various types of pallets generally used by industry and showed miniature models of such pallets. He then entered into his main theme, a discussion of the new type expendable pallets which are especially engineered to fit specific problems, such as the transportation of bulk items and items packed in bags and cartons, using carbon black as an example.

The speaker used numerous slides to indicate how expendable pallets were being adopted in the rubber and other industries, and concluded his talk by stressing the number of advantages offered by these new type pallets, including reduced handling costs, fewer damage claims, and the requirement for less manpower. Specific instances of cost savings were recounted.

Coming Events

Nov. 18. R. I. Rubber Club, Crown Hotel, Providence, R. I.
Nov. 18. Northern California Rubber Group.
Nov. 23. Washington Rubber Group, Cosmos Club, Washington, D. C.
Nov. 28-Dec. 3. American Society of Mechanical Engineers, Annual Meeting, Pennsylvania Hotel, New York, N. Y.
Dec. 7. Los Angeles Rubber Group. Xmas Party.
Dec. 9. Southern Ohio Rubber Group, Xmas Party, Miami Valley Country Club, Dayton, Ohio.
Dec. 10. New York Rubber Group, Xmas Party, New York, N. Y.
Dec. 10. Detroit Rubber & Plastics Group, Xmas Party, Detroit-Leland Hotel, Detroit, Mich.
Dec. 14. Buffalo Rubber Group, Xmas Party, Westbrook Hotel, Buffalo, N. Y.
Dec. 17. Boston Rubber Group, Somerset Hotel, Boston.
Jan. 10-14. Third National Materials Handling Show, Convention Hall, Philadelphia, Penna.

Dispersed Colorants For Vinyls

The Plastic Products Division of the Schiefer-Eldridge Printing Ink Corp., Brooklyn, N. Y., has announced a new series of dispersed colorants especially prepared for the vinyl plastics industry. These are said to offer the advantages of excellent uniformity, extremely fine grind, and ease of handling. The company claims that the development of the colorants represents a new technique in successfully utilizing monomeric plasticizers, such as di-octyl phthalate (D.O.P.), as a dispersing medium for vinyl colorants. The company is said to have had unusual success with a number of the less readily dispersed materials such as phthalocyanine blue and green, pigment scarlet "Z", lithol rubines, special maroons, and particularly carbon blacks. Carbon black dispersions are at concentrations equivalent to master chips—master batches and still possess unusual softness and flow properties which are said to make them clean and easy to handle in the plant.

The advantages and limitations of spring mountings, rubber mountings, and cork materials in the control of vibration, together with data on their installation and uses, are given in a new bulletin recently issued by the Korfund Co., Inc., Long Island City 1, N. Y.

AKRON GROUP HEARS RISING ON LABOR RELATIONS TRENDS

The Akron Rubber Group held its Fall Meeting on October 15 at the Mayflower Hotel, Akron, Ohio, with approximately 300 members and guests in attendance. Frank Rising, general manager of the Automotive and Aviation Parts Manufacturers, Inc., Detroit, Mich., addressed the group on "The Trend in Labor Relations." The speaker, who is nationally known as an authority on labor problems, predicted increasingly turbulent labor conditions throughout industry next year.

Mr. Rising based his forecast on the belief that "unions are going to get tough" next year. The speaker also stated that fourth round wage raises are going to be difficult to obtain, and stated that no matter what party is in office next year, the labor situation will be turbulent. The speaker expressed the opinion that there will be no lasting industrial peace as long as "unions seek to divide the people along class lines."

Mr. Rising decried the bitter attacks carried in union papers on the very companies which employ the attackers. "The only way to combat the vicious stuff fed to the workers is for management to become more articulate," he said. "Management has been almost voiceless in getting across to its employees and the public its story and the problems it faces," Mr. Rising maintained.

At the business session of the meeting it was announced that the Winter Meeting of the group, scheduled for February 18, will feature an afternoon symposium on industrial fabrics and a talk by L. F. Livingstone, manager of public relations of E. I. du Pont de Nemours & Co., Inc.

No. California Hears Mesick

Approximately 60 members and guests attended the October 28 meeting of the Northern California Rubber Group held at the Claremont Hotel, Berkeley, Calif. Colonel Benjamin S. Mesick, in charge of research and development of solid fuel rockets for the United States Army Ordnance Department at the California Institute of Technology, showed the group a motion picture on "The Military Application of Jet Propulsion." Colonel Mesick described the three types of jet propulsion—rockets, turbo jets, and ram jets—and discussed the applications to which each of the three are put. Another motion picture entitled 'Rubber," released by the Rubber Development Bureau, Washington, D. C., was also shown to the group.

ASME RUBBER DIVISION SETS PROGRAM FOR FALL MEETING

The Rubber and Plastics Division of the American Society of Mechanical Engineers will hold two technical sessions on November 30 at the Hotel Pennsylvania in New York City, as a part of the annual meeting to be held November 28 through December 3. J. F. Downie Smith, Dean of Engineering, Iowa State College, is chairman of the Division, and D. H. Cornell of the B. F. Goodrich Research Center, is secretary.

The first session, which will begin at 9:30 A.M. on November 30, has the following papers scheduled for presentation:

Soft Rubber Bearings—Design Features and Methods of Application Under Conditions of Water Lubrication, A. Badner (Lucian Q. Moffitt).

Report on Friction Test on Flow Control of Continuous Film of Rubber Bearings, J. W. Stanley (E. J. Willis).

Nylon as a Bearing Material, D. B. Hanson (DuPont).

At the second session, at 2:30 P.M. on the same day, these additional papers are to be heard:

Frictional Characteristics of O-Rings with a Typical Hydraulic Fluid, L. E. Cheyney, W. J. Mueller, and R. E. Duval (Battelle).

Laboratory Testing of Rubber Bearings, J. R. Beatty and D. H. Cornell (Goodrich).

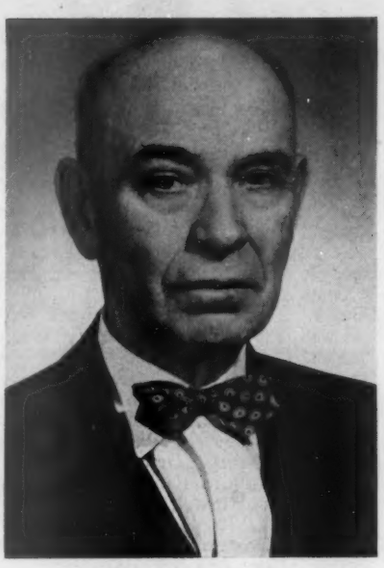
Advances in Rubber During 1948, Lois W. Brock, G. H. Swart, and E. V. Osberg (General Tire).

Advances in Plastics During 1948, E. L. Kropscott (Dow Chemical).

ATA Seeks Repeal of Tire Tax

A resolution asking for the repeal of excises on tires and tubes, motor vehicles, accessories, motor fuel and oil was adopted by the board of directors of the American Trucking Association, Inc., at the fifteenth meeting of the organization on October 20, in Washington, D. C. Herman D. Horton of Charlotte, N. C., chairman of Associated Transport, Inc., was elected ATA president for the next year. He succeeded Ted V. Rodgers of Scranton, Penna., first ATA president. Mr. Rodgers, who served since 1935, was named honorary board chairman for life. ATA directors also adopted a set of 12 principles governing leasing of trucks and planned to present them at interstate commerce commission hearings which were scheduled to begin on October 24.

Martin Retires From U.S. Rubber



Luther B. Martin

Luther B. Martin, technical director of tire production for the U. S. Rubber Co., retired on November 1, after thirty years of continuous service. A native of Allendale, S. C., and a graduate of the National Law School, Washington, D. C., Mr. Martin joined the rubber company in 1918 as a chemist in the Hartford Rubber Works, Hartford, Conn. He was subsequently made laboratory superintendent at the Providence Rubber Co. and in 1923 was appointed assistant factory superintendent of the Hartford Rubber Works. He was made factory manager there in 1929, and in 1930 was transferred to the company's Detroit, Mich., plant. Three years later he was appointed manager of tire quality and in 1944 was made assistant director of tire development for the company's tire division, involving five tire and tube plants located at Detroit, Eau Claire, Wis., Chicopee Falls, Mass., Los Angeles, Calif., and Indianapolis, Ind. In March 1945, he was appointed director of tire development with headquarters at Detroit, which was the position he held prior to the post of technical director of tire production. During the war, Mr. Martin was chairman of the Ordnance Advisory Committee of the Tire and Rim Association, a member of the war Production Board Tire and Tube Technical Consulting Committee, and a member of the Synthetic Test Committee of the Tire Industry. His services during the war were recognized by the Government with the Award of Merit for his work on synthetic rubber tires.

New Philblack Binder

The Rubber Chemicals Division of the Phillips Petroleum Co., Akron 8, Ohio, has made available a new loose-leaf binder for its Philback technical bulletins. All of the bulletins issued to date are included in the new binder. Several blank pages are provided to enable the user to jot down favorite Philback recipes and other pertinent data.

DISCUSSION ON THE VISTACS FEATURES BUFFALO MEETING

Approximately 75 members and guests of the Buffalo Rubber Group attended the October 19 meeting held at the Westbrook Hotel, Buffalo, N. Y. Principal speaker of the evening was Henry P. Pryor of the Advance Solvents & Chemical Corp. The subject of Mr. Pryor's address was "Vistac in Rubber."

Mr. Pryor explained that "Vistac" is a trade name for a series of relatively low molecular weight polybutenes of which Vistac 1, 2, and 4 are the chief members. The Vistacs are synthetic hydrocarbon polymers obtained by the catalytic polymerization of normal and branched chain butenes derived from petroleum. They consist primarily of homolgous branched straight chain hydrocarbons, and are completely saturated.

Data were presented illustrating the effect of Vistac on natural rubber and GR-S, as well as its effects on butyl rubber, neoprene, and Buna-N type rubbers. This was followed by a display and discussion of various articles of manufacture and the solution of problems in which the Vistacs played a vital role.

The speaker depicted the versatility of the Vistacs by a discussion of its present and future potential in the miscellaneous field as is currently demonstrated by uses in the surgical and industrial tape field, wax and asphalt modifications, in the paper, paint, cable and insulation industries, and more. The extreme resistance of the product to water vapor, gases and alkalies, the adhesive properties, the ability to flow at low temperatures, the non-toxic features, are among the properties spurring new thought and usage, Mr. Pryor said.

Appoints American Representative

Wm. Butler & Co. (Bristol), Ltd., Siverthorne Lane, St. Phillips, Bristol 2, England, has announced the appointment of the Coaltar Chemicals Corp., 420 Lexington Avenue, New York City, as American representative for the distribution of a wide range of coal tar chemicals of British manufacture. The Butler company, distillers of tar and petroleum since 1843, operates refineries at Crew's Hole and Gloucester, England. The Coaltar corporation will continue to carry on its regular business operations as heretofore.

Author's Correction

An error has been noted in the article "Comparison of the Carrying Capacities of Rough and Smooth Bore Oil Suction and Discharge Hose Under Simulative Service Conditions," by Messrs. Werkenthin, James, and Morris, which was published in the September, 1947, issue of RUBBER AGE. On page 696, the line which reads "P = pressure drop in pounds per square inch" should read "P = pressure drop in pounds per square foot." It is suggested that readers note this change in their copies.

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MICRONEX W-6

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STATEX-B

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STATEX-K

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FEF (Fast Extruding Furnace)

STATEX-M

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SRF (Semi-Reinforcing Furnace)

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EUROPEAN RUBBER RESEARCH DISCUSSED BY DR. L. A. WOOL

A talk on "Rubber Technology and Research in Western Europe," by Dr. Lawrence A. Wood, chief of the rubber section of the National Bureau of Standards, featured the October 26 meeting of the Washington Rubber Group at the Cosmos Club in Washington, D. C. Approximately 65 members and guests were in attendance.

With Chairman T. A. Werkenthin (Bureau of Ships) presiding, the minutes of the previous meeting were read and approved and a short report was given by the secretary-treasurer. It was then announced that a few changes had been made in the heads of various committees and that R. W. Hackett (Rubber Reserve) was now chairman of the Publicity Committee, T. R. Scanlan (Gates Rubber) of the Program Committee, and Richard Harmon of the Membership Committee. It was also announced that the next meeting of the group would be held on Tuesday, November 23.

Dr. Wood's talk was built around a number of interesting slides based on photographs he had taken during a recent three-month visit to Western Europe, during which he gave a paper at the International Rubber Conference in London. In all, he stated, he visited some twenty different laboratories engaged in one way or another with rubber research.

Showing some pictures of the building occupied by the French Rubber Institute (Institut Francais du Caoutchouc) in Paris, Dr. Wood stated that France was currently consuming rubber at the rate of almost 90,000 long tons a year. There is still a tire shortage in France, he added, which can in part be attributed to the fact that the government insists that some 40% of all tires made be exported. He also referred to some of the development work being done in the country on metal cord tires.

Dr. Wood then described some of his experiences in Switzerland, including visits to the universities at Basle and Zurich. Considerable research was in progress at these universities on both the crystallization phenomena of rubber and on stress-strain properties.

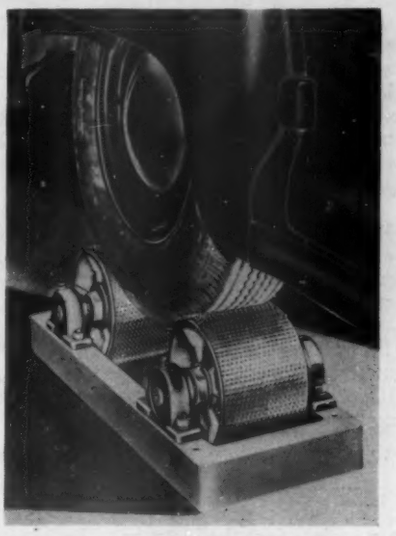
Turning to his visit to the Netherlands, the speaker told of his trips through the laboratories of both the Rubber Stichting (Rubber Foundation), which is supported at government level, and the Netherlands Rubber Institute, a technical organization supported by the Dutch rubber manufacturing industry. He also visited the laboratory of the Royal Dutch Shell Co., where work is being done on a new fiber which is a chemical derivative of natural rubber.

The concluding portion of the talk was concerned with Dr. Wood's extensive visit in England, where he witnessed the work being done by both the British Rubber Producers' Research Association and the Research Association of British Rubber Manufacturers. He was impressed with the fact that the library maintained by the latter organization boasts of some 71,000 papers on rubber and has an indexing system which numbers over 600,000 cards.

Other visits in England included the laboratories of the Dunlop Rubber Co., where, among other things, tires are tested at speeds of 400 m.p.h., and those of Imperial Chemical Industries, where considerable attention is paid to synthetic rubber. In concluding his talk, Dr. Wood told of the rubber courses given at the Northern Polytechnic and efforts currently being made to organize a National Rubber College.

Winter-Grip Tire Tread

The Goodyear Tire & Rubber Co. has introduced what is said to be a new and revolutionary tread treatment for tires now available to motorists for protection against the hazards of winter driving. Named "Winter-Grip", the tread is obtained by means of a device known as the Goodyear Tractionizer which mechanically pierces the tire tread, leaving thousands of small holes to a depth of one-eighth inch to three-sixteenth inches. Complete treatment is accomplished by the Tractionizer, a mechanism consisting of two rollers. The rear end of the car is jacked up and each tire in turn is set down between the two rollers which are studded with hooked barbs one-quarter inch long. Powered by the car, the wheel is rotated, piercing the tread with a multitude of tiny perforations that expose sharp edges to grip the road. The company states that any tire other than one having less than one-sixteenth inch tread design remaining can be treated in this manner. The Winter-Grip treatment may only be obtained from Goodyear dealers.



Shown is a Goodyear Tractionizer used for performing the new treatment on tire tread.

The history, products and present activities of the Koppers Co. are outlined in a new sixteen-page booklet recently published by the company.

GILLILAND ADDRESSES NEW GROUP ON DEVELOPMENTS IN SYNTHETICS

The first meeting of the newly-established Division of the Chemistry of Rubber and Allied Substances, Northeastern Section, American Chemical Society, held on October 21 at the Massachusetts Institute of Technology, was addressed by Professor Gilliland of the Institute on recent developments in synthetic rubber manufacturing. Professor Gilliland stated that major improvements in syntheic rubber are awaiting the development of polymerization techniques more closely resembling the natural processes which take place in the rubber tree.

The speaker described the wartime-developed process for the manufacture of butadiene-styrene synthetic (GR-S), and outlined the characteristics of this material which render it inferior in some respects to natural rubber. He reported on various attempts to modify the original manufacturing process in order to obtain a product closer in its properties to natural rubber.

The most significant development in this direction, he said, has been the synthesis of so-called "cold rubber." This substance is manufactured in a manner very similar to that employed previously for GR-S, but polymerization is carried out at much lower temperatures. The resultant polymer, Professor Gilliland reported, is definitely superior to GR-S in its physical properties when compounded, but for general use it is still inferior to natural rubber compounded in the same manner. Further development in the technique of polymerization may lead to major improvements in GR-S type rubbers, the speaker concluded.

Virgin Heads Trenton Section

Carl W. Virgin, chief research chemist of the Vulcanized Rubber and Plastics Co., Inc., has been elected chairman of the Trenton, N. J., Section of the American Chemical Society, succeeding N. Richard Yorke of the St. Regis Paper Co., Trenton, first chairman of the group. Newell A. Perry of the Thermoid Co., was named vice-chairman, and Francis G. Mendrey of H. N. Richards Co. and John J. De Munnik of the American Tile and Rubber Co. were re-elected secretary and treasurer, respectively. The new chairman, Mr. Virgin, joined the Vulcanized Rubber and Plastics Co. in 1943. For two years he was with the Mellon Institute for Industrial Research, Pittsburgh, Penna., and among the concerns with which he was connected were the Ellis-Foster Co., Montclair, N. J., and the Standard Register Co., Dayton, Ohio.

NAMES IN THE NEWS

H. M. Brubacker, formerly associated with the Philblack Division of the Phillips Petroleum Co., has joined the sales staff of the Sid Richardson Carbon Co.

Leonard Fortune, formerly production manager of the Fremont Rubber Co., has joined the Clorox Chemical Co. at Cleveland, Ohio, in a similar capacity.

Dr. Gilbert Thiessen, formerly development manager of the Chemical Division of the Koppers Co., Inc., at Pittsburgh, Penna, has been named technical advisor for that division.

Charles N. Woodbury, associated with the Hood Rubber Co., Watertown, Mass., since 1904, most recently as assistant export manager, has retired after forty-five years of service.

James A. Braswell, Jr., formerly senior compounder at the Memphis, Tenn., plant of the Firestone Tire & Rubber Co., has sailed for Bombay, India, where he will be chief chemist of the Firestone plant in that area.

C. W. Staacke, formerly associated with the B. F. Goodrich Co. for 22 years, and one of the country's leading belt conveyor engineers. has joined Hewitt-Robins, Inc., as technical consultant and special assistant to Thomas Robins, Jr., president.

Arthur W. Carpenter, manager of physical testing laboratories at the Akron plants of the B. F. Goodrich Co., has been loaned to the Government for service on the National Security Resources Board in Washington, D. C., for a period of three months.

Dr. Edward Wichers, formerly assistant chief of the Chemistry Division of the National Bureau of Standards, has been appointed division chief, succeeding Dr. G. E. F. Lundell who has retired from active duty but will remain as consultant to the division.

Edward F. Kirik, formerly sales engineer for the H. O. Canfield Co., has been appointed general sales manager of the Bond Rubber Corp., Derby, Conn.

John A. Zellhoefer has been appointed sales manager of the Chemicals

C. E. Blanchard, formerly associated with the B. F. Sturtevant Co. in the design and sale of special drying equipment, has joined the staff of the J. O. Ross Engineering Corp. in a similar capacity, with headquarters in Boston, Mass.

Ralph Lottes, associated with the Seiberling Rubber Co. since 1940 as a territory salesman, has been named sales manager of the Howatt Rubber & Supply Co., Inc., Cleveland, Ohio.

R. C. Witmore, is now associated with the Better Monkey Grip Co. at Dallas, Texas, in the capacity of technical director.

Fleet Perrine, formerly a field representative of the United Rubber Workers, CIO, has been appointed organizational director succeeding N. H. Eagle.

Pierre S. duPont III, descendant of the founder of E. I. du Pont de Nemours & Co., Inc., and manager of rayon tire yarn sales for the company, has been elected a director of the company.

Otto L. Schweng, associated for the past four years with the Development Department of the General Aniline and Film Corp., as an economic specialist, has been appointed to the newly created post of director of market research for the Diamond Alkali Co.

B. M. Halpern, president of the Bramley Machinery Corp., has departed for the British Isles and the Continent to investigate progress in dispersion-mixing, particularly in the rubber, plastics, paint and other chemically related industries.

F. Scott Carpenter, Jr., previously associated with the Grasselli Chemicals Division of E. I. du Pont de Nemours & Co., Inc., has joined the Special Carbon Blacks Section of the Research and Development Department of Godfrey L. Cabot, Inc., Boston, Mass.

R. G. Jeter, one of Akron's leading attorneys, has been appointed general counsel of the B. F. Goodrich Co. He was graduated from Ohio State University in 1932.

Dr. James E. Ablard, chemist at the General Tire & Rubber Co., has been warded a certificate of merit from the Departments of the Army and Navy for is work during the war.

James A. Rafferty, vice-president of e Union Carbide and Carbon Corp., has en awarded the Chemical Industry edal for 1948 by the American Section the Society of Chemical Industry, for leadership in developing the billionlar synthetic aliphatic industry.

A. Boyd Cornell, executive vice-president of the Hamilton Rubber Manufacturing Corp., with which he has been associated since 1918, has been elected a director of the Acme-Hamilton Manufacturing Corp., which operates both the Hamilton concern and the Acme Rubber Manufacturing Co.

Harry P. Smith, formerly New York district sales manager of the Mathieson Chemical Corp., has been made assistant general manager of sales. His headquarters will remain in the company's New York offices.

M. E. Lerner, editor of Rubber Age, has been appointed a member of the Executive Committee of the Rubber and Plastics Division of the American Society of Mechanical Engineers for a five-year term.

Cecil A. Smith, assistant district sales manager of the N. J. Zinc Sales Co., has been named district sales manager. He will continue to make his headquarters in the Guardian Trust Building, Cleveland.

T. Spencer Shore, well-known industrialist and investment banker ,and formerly vice-president and treasurer of the General Tire & Rubber Co., has been elected president of the Eagle-Picher Co.

Samuel B. Ellis, formerly associated with the export divisions of both the Goodyear Tire & Rubber Co. and the U. S. Rubber Co., has been named director of export sales for the Hamilton Rubber Manufacturing Corp.

Samuel Broers, president of the Firestone International Co., recently left the United States for a two-month business tour of the Southwest Pacific which will include attendance at the formal opening of Firestone's new tire plant at Papanui, near Christchurch, New Zealand.

Lester J. Koch, export manager of the Witco Chemical Co., left the United States recently for an extended business trip to England and the Continent.

Hayes B. Robinson, formerly associated with the Kirkhill Rubber Co., is now associated with the Reeves Rubber Co. in charge of the Extrusion Department.

Robert B. Coleman, previously associated with the Pharis Tire & Rubber Co., has joined the W. J. Voit Rubber Corp. as assistant chemist.

Victor H. Boden, associated with the Carbide and Carbon Chemicals Corp. since 1933, and district sales manager of the Philadelphia office since 1940, has been appointed Eastern Sales Manager with headquarters in Philadelphia.

Firestone has made available an informational release prepared in question and answer form dealing with Foamex, the company's foamed latex material.

INDEXING SERVICE OF RUBBER COMPOUNDS OFFERED BY NEW CONCERN

Something entirely new in the way of service to the rubber manufacturing industry, both in this country and abroad, is being sponsored by The Rubber Formulary, a new organization established in Bakersfield, California. The concern is offering an indexing service of rubber compounds, based on the punch card system. The Rubber Formulary is headed by Kathleen S. Rostler as editor.

A card has been designed by The Rubber Formulary for the service, which classifies rubber compounds by tensile strength, elongation, hardness, type of rubber hydrocarbon, and black or non-black filler. A number of marked spaces are also provided to be used by the subscriber who may be interested in classifying by other properties or ingredients. The card is being printed exclusively for the company by the Charles R. Hadley Company, Los Angeles, and is built around their 5 x 8 inch single punch Rocket card.

The service is offered as a yearly subscription and consists of monthly abstracts of rubber compounds published in the more important journals. The rubber compounds are reported individually on the cards, and the abstract consists of composition and physical properties of the compound, together with the original literature reference.

This method of recording and sorting rubber compounds was originally developed by a group of rubber chemists for their own use in compounding research. The system proved so versatile and adaptable to many applications that it appeared to merit extension into this service.

Designed for Quick Reference

The service, which is designed to permit quick location of any compound in the files without the necessity of cross-referencing, should prove of considerable interest to everyone whose work is concerned with rubber compounds. Technical papers dealing with the chemistry and technology of rubber contain a number of compounds for which physical properties are reported in the form of tables or graphs or both. These compounds constitute valuable information for compounders beyond the illustrative purpose for which the author has used them.

From the aspect of finding any of the compounds at a later time, however, the information is not readily available, but is scattered throughout the literature. Hunting through the literature to find compounds with certain desired properties is usually a fruitless task. The Rubber Formulary furnishes the service of recording, classifying and sorting these compounds in such a way that they are permanently available for quick reference.

Abstracts of compounds published in 1948 and subscriptions for 1949 are offered at present. If warranted by demand, abstracts of previous years will also be prepared.

Blank cards are also being offered for compounders interested in recording and filing compounds from their own records in the same manner so that they may be sorted at the same time as the compounds supplied by The Rubber Formulary.

A booklet describing the service in detail is available on request from The Rubber Formulary, 115 George Hay Building, 1612 Nineteenth Street, Bakersfield, California.

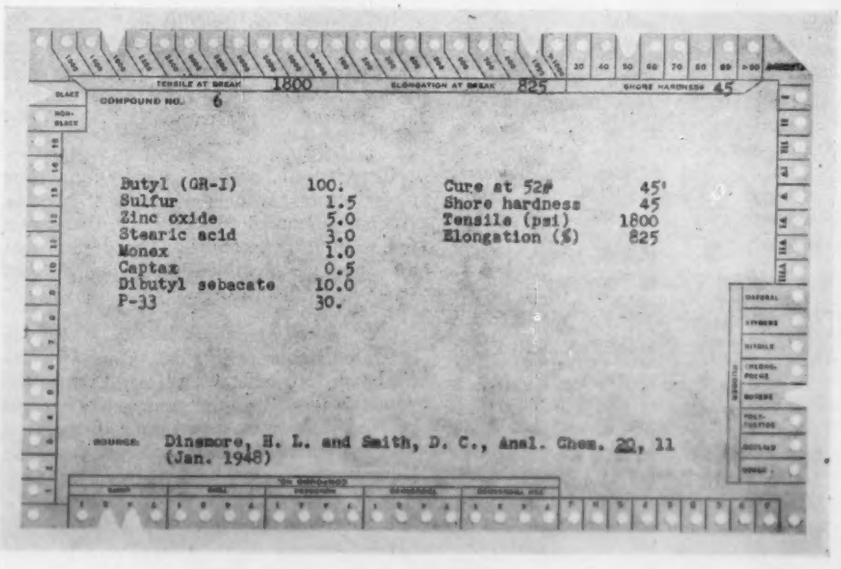
Background of Mrs. Rostler

Kathleen S. Rostler, editor of The Rubber Formulary, is the wife of Dr. Fritz Rostler, director of research and development of the Golden Bear Oil Co. She is a member of the American Chemical Society, of the ACS Rubber Division, and of Phi Kappa Phi.

Mrs. Rostler holds an A. B. degree from the University of Delaware, from which she graduated in 1937 with honors in course and distinction in chemistry. She has a master's degree in chemistry from Connecticut College at New London, where she majored in colloid chemistry and where she was a fellow and assistant in the department while earning her degree.

Kathleen S. Rostler

Mrs. Rostler entered the field of rubber chemistry in 1939 as assistant to the chief chemist of Wilmington Chemical Corporation in Wilmington, Delaware. During the five years she held this position, she was instrumental in setting up the laboratories for physical testing of rubber, she trained and supervised the technicians, and was in charge of the library, of literature abstracting, and of filing laboratory reports. From 1945 to 1947 Mrs. Rostler held the position of Associated Research Chemist at the Engineering Experiment Station of the University of Delaware, engaging in research on rubber.



Replica of punch card designed by The Rubber Formulary for recording and indexing rubber compounds.

Kolthoff Awarded Nichols Medal

For his world leadership in the development of modern analytical chemistry, Professor I. M. Kolthoff of the University of Minnesota has been awarded the William H. Nichols Medal of the New York Section of the American Chemical Society for 1949. Professor Kolthoff, a native of the Netherlands, is also noted for his extensive fundamental research in recent years on the emulsion polymerization process, key step in the manufacture of synthetic rubber. The Nichols Medal, one of the highest honors in chemical science, will be presented to Professor Kolthoff at a joint meeting of the New York Section and the American Section of the Society of the Chemical Industry at the Hotel Pennsylvania on March 11, 1949.

Dissolve Frazier Rubber Products

Frazier Rubber Products Corp., Carey, Ohio, by unanimous consent of its stockholders has elected to dissolve and terminate its affairs. A certificate of dissolution was filed in the office of the Secretary of State of Ohio on September 30, 1948.

CURRENT NEWS OF THE MONTH

ACS CHICAGO SECTION SPONSORS NATIONAL CHEMICAL EXPOSITION

The 1948 National Chemical Exposition, held in the Coliseum, Chicago, Ill., was the largest in the number of exhibits of the five biennial shows sponsored since 1940 by the Chicago Section of the American Chemical Society. The show ran for five days from October 12 to 16. Admission was limited to representatives of the chemical and allied industries. There were 201 exhibitors.

Among other highlights were the facilities provided to aid manufacturers and business men seeking a solution of their production problems through the use of chemistry. Many availed themselves of the opportunity afforded to get authoritative information. The maintenance of a 'Technical Bureau" made this possible. It was manned by Dr. Ward V. Evans, retired chairman of the chemistry department of Northwestern University, and now professor of chemistry at Loyola Universtiy, Chicago.

Among the papers which were presented at the exposition was a talk on 'Science and the Future," presented by Dr. E. R. Weidlein, director of the Mellon Institute. Bruce Brown, president of the Standard Oil Co. of Indiana, spoke on the interrelation of the petroleum and the organic chemical industry.

Some features of interest in an exhibit sponsored by the Department of Agriculture were displays of low-grade cotton materials, chemically-treated to look and wear like linen; cotton fabrics which had been treated to resist rot and decay; and an automobile tire which had been driven at 60 miles per hour for nearly 70,000 miles in official Army Ordnance tests. It is believed that the use of carefully selected varieties of cotton for the manufacture of cords, such as were used in this tire, will add to the service and mileage obtainable from casings.

The use of waste products for resins, turpentine, pine oil and insecticides has proved successful, judging from the results obtained by one exhibitor. These are derived from stumps of southern pine. Also on exhibit were chemical cotton and cellulose acetates for use in plastics manufacture. These had been derived from a poor grade of cotton linters, heretofore considered useful only for fertilizer.

Highlight of the National Industrial Chemical Conference was the dinner meeting, held on October 14, at which Dr. Charles Allen Thomas, president of the American Chemical Society, was the principal speaker. In his address, Dr. Thomas emphasized as reasons for the phenomenal growth and development of America, the wide application of science and its methods, and the country's favorable social environment. He pointed out that we have been very fortunate in that our country's founders recognized liberty as essential to man's continual aspiration toward his ultimate goal.

Much of the success of the show was attributed to the efforts of officials of the Chicago Section of the American Chemical Society.

Walking Test for Soles

Results of an interesting walking test, conducted in Washington, D. C., to compare the relative merits of two types of shoe soles, leather and Neolite, have been announced by the Goodyear Tire & Rubber Co. Six high school and college students were employed by Goodyear to walk five to twenty miles daily on the streets of the nation's capital. The hikers averaged 300 miles each over a period of 23 days, in order to compare the effects of Neolite and conventional leather shoe soles, particularly from the standpoint of foot health. The walking tests were conducted under the auspices of the Clinical Research Division of the National Association of Chiropodists. It was found that no harmful effects resulted from wearing either Neolite or leather. Neolite, however, gave approximately 100% more mileage than the average leather sole. It was also determined that a person's height and weight have no standard effect on shoe life. Many small-type persons wear out a pair of shoes twice as fast as a six-foot heavyweight.

Coated Fabrics Plant Closes

The coated fabrics plant of the Atlas Powder Co. at Stamford, Conn., will be closed down as soon as current sales orders are filled, Isaac Fogg, president of the company, announced recently. It is expected that production will cease before the end of November. Mr. Fogg said that the action is being taken due to the unsatisfactory conditions in the coated fabrics industry, the substantial losses in these products and the unsatisfactory outlook for the future. Negotiations are now in progress for the sale of the real estate and equipment. The manufacture and sale of industrial finishes at Stamford and North Chicago, Ill., and of Revolite laundry rolls and press covers at Stamford will be continued.

TIRE PRODUCERS FINED $50,000 AFTER NOLO CONTENDERE PLEA

Fines totaling $50,000 were imposed by Federal Judge John C. Knox of the U. S. District Court of New York on October 21 on eight tire manufacturers, the Rubber Manufacturers Association, and two of its officers after their plea of nolo contendere to a criminal information charging violation of the Sherman Anti-Trust Act.

The defendants were charged in the information, filed in March, 1947, with conspiring to agree on prices, discounts, allowances, bonuses and other related practices for the purpose of eliminating competition in the sale and distribution of tires. Trial was to begin early next year.

Judge Knox imposed a fine of $5,000 on the association and $2,500 each on A. L. Viles, its president, and George Flint, assistant secretary. The following were fined $5,000 each: Dayton Rubber Company, Dayton, Ohio; Lee Rubber and Tire Company, Conshohocken, Pa.; United States Rubber Company, New York, and Firestone Tire and Rubber Company, General Tire and Rubber Company, B. F. Goodrich Company, Goodyear Tire and Rubber Company and Seiberling Rubber Company, all of Akron, Ohio.

J. Francis Hayden, special assistant Attorney General in charge of New York office of the anti-trust division, said the Government had dropped charges against the following: J. L. Cochrun, vice president of Seiberling; I. Eisbrouch, vice president of Dayton Rubber; A. A. Garthwaite, president of Lee Rubber; H. N. Hawkes, assistant general manager of United States Rubber; Lee R. Jackson, executive vice president of Firestone; L. A. McQueen, vice president of General Tire; J. J. Newman, vice president of B. F. Goodrich, and R. S. Wilson, vice president of Goodyear.

Acquires Plastics Institute

The West Coast University, of Los Angeles, Calif., has acquired the laboratories and the training facilities of the Plastics Industries Technical Institute, 1609 South Western Avenue, Los Angeles, Calif. West Coast has retained the staff of the Plastics Institute and will offer courses in plastics technology on three levels. These include a nine semester course in mechanical engineering with specialization in plastics processing, leading to the degree of bachelor of science; an intensive four-month course in plastics fabrication for resident students; and a one-year home study course for up-grading plastics industry personnel, or as preparation for employment in the industry.

TWO TALKS FEATURE MEETING OF NEW YORK RUBBER GROUP

Two interesting talks featured the Fall Meeting of the New York Rubber Group, held on October 15 at the Henry Hudson Hotel in New York City. The talks were "GR-S Achieves Major Advance in Performance," by Dr. William F. Tuley, Operations Manager, Naugatuck Chemical Division, U. S. Rubber Co., and "Palletizing of Raw Materials for the Rubber Industry," by William T. Donahue, of the Addison-Semmes Corp., Racine, Wis. Approximately 300 members and guests were in attendance.

Dr. Tuley briefly reviewed the progress made by GR-S to date and then launched into a discussion of the new low temperature polymers, emphasizing the qualities which have been substantially improved in carbon blacks stocks made with the new polymers and outlining some important properties which have not yet been improved to any great degree. Among the latter he listed tensile strength of non-black compounds, hysteresis or heat build-up, stiffening at low temperatures, atmospheric cracking, and tackiness of raw stocks.

A considerable portion of the talk was devoted to the effects of low temperature polymerization on the composition of the polymer. In this connection, the speaker stated that there is evidence that as the polymerization temperature is decreased, the structure of GR-S becomes more regular although it does not approach that of natural rubber. Faint but definite X-ray patterns have been secured which indicate increasing regularity, especially with high butadiene polymers formed at sub-freezing temperatures.

Pointing out that tests have proved the low temperature polymers will give tire treads with 30% longer wear than natural rubber treads, Dr. Tuley also predicted widespread use of these polymers in footwear, wire insulation and mechanical goods in general. He also pointed out that manufacturers of non-transportation products already are using 25 to 30% of all GR-S consumed on a voluntary basis.

In concluding his talk, Dr. Tuley forecast that low temperature GR-S will displace present standard types of GR-S as rapidly as it is made available, that demand for low temperature GR-S will probably exceed supply for the next 12 to 18 months, and that consumers will benefit from better performance through the use of such GR-S. (EDITOR'S NOTE: Dr. Tuley's paper is published in full elsewhere in this issue.)

The talk on "Palletizing of Raw Materials" by Mr. Donahue, the second speaker, was received with a good deal of interest. Mr. Donahue first described the various types of pallets generally used by industry and showed miniature models of such pallets. He then entered into his main theme, a discussion of the new type expendable pallets which are especially engineered to fit specific problems, such as the transportation of bulk items and items packed in bags and cartons, using carbon black as an example.

The speaker used numerous slides to indicate how expendable pallets were being adopted in the rubber and other industries, and concluded his talk by stressing the number of advantages offered by these new type pallets, including reduced handling costs, fewer damage claims, and the requirement for less manpower. Specific instances of cost savings were recounted.

Coming Events

Nov. 18. R. I. Rubber Club, Crown Hotel, Providence, R. I.
Nov. 18. Northern California Rubber Group.
Nov. 23. Washington Rubber Group, Cosmos Club, Washington, D. C.
Nov. 28-Dec. 3. American Society of Mechanical Engineers, Annual Meeting, Pennsylvania Hotel, New York, N. Y.
Dec. 7. Los Angeles Rubber Group. Xmas Party.
Dec. 9. Southern Ohio Rubber Group, Xmas Party, Miami Valley Country Club, Dayton, Ohio.
Dec. 10. New York Rubber Group, Xmas Party, New York, N. Y.
Dec. 10. Detroit Rubber & Plastics Group, Xmas Party, Detroit-Leland Hotel, Detroit, Mich.
Dec. 14. Buffalo Rubber Group, Xmas Party, Westbrook Hotel, Buffalo, N. Y.
Dec. 17. Boston Rubber Group, Somerset Hotel, Boston.
Jan. 10-14. Third National Materials Handling Show, Convention Hall, Philadelphia, Penna.

Dispersed Colorants For Vinyls

The Plastic Products Division of the Schiefer-Eldridge Printing Ink Corp., Brooklyn, N. Y., has announced a new series of dispersed colorants especially prepared for the vinyl plastics industry. These are said to offer the advantages of excellent uniformity, extremely fine grind, and ease of handling. The company claims that the development of the colorants represents a new technique in successfully utilizing monomeric plasticizers, such as di-octyl phthalate (D.O.P.), as a dispersing medium for vinyl colorants. The company is said to have had unusual success with a number of the less readily dispersed materials such as phthalocyanine blue and green, pigment scarlet "Z", lithol rubines, special maroons, and particularly carbon blacks. Carbon black dispersions are at concentrations equivalent to master chips—master batches and still possess unusual softness and flow properties which are said to make them clean and easy to handle in the plant.

The advantages and limitations of spring mountings, rubber mountings, and cork materials in the control of vibration, together with data on their installation and uses, are given in a new bulletin recently issued by the Korfund Co., Inc., Long Island City 1, N. Y.

AKRON GROUP HEARS RISING ON LABOR RELATIONS TRENDS

The Akron Rubber Group held its Fall Meeting on October 15 at the Mayflower Hotel, Akron, Ohio, with approximately 300 members and guests in attendance. Frank Rising, general manager of the Automotive and Aviation Parts Manufacturers, Inc., Detroit, Mich., addressed the group on "The Trend in Labor Relations." The speaker, who is nationally known as an authority on labor problems, predicted increasingly turbulent labor conditions throughout industry next year.

Mr. Rising based his forecast on the belief that "unions are going to get tough" next year. The speaker also stated that fourth round wage raises are going to be difficult to obtain, and stated that no matter what party is in office next year, the labor situation will be turbulent. The speaker expressed the opinion that there will be no lasting industrial peace as long as "unions seek to divide the people along class lines."

Mr. Rising decried the bitter attacks carried in union papers on the very companies which employ the attackers. "The only way to combat the vicious stuff fed to the workers is for management to become more articulate," he said. "Management has been almost voiceless in getting across to its employees and the public its story and the problems it faces," Mr. Rising maintained.

At the business session of the meeting it was announced that the Winter Meeting of the group, scheduled for February 18, will feature an afternoon symposium on industrial fabrics and a talk by L. F. Livingstone, manager of public relations of E. I. du Pont de Nemours & Co., Inc.

No. California Hears Mesick

Approximately 60 members and guests attended the October 28 meeting of the Northern California Rubber Group held at the Claremont Hotel, Berkeley, Calif. Colonel Benjamin S. Mesick, in charge of research and development of solid fuel rockets for the United States Army Ordnance Department at the California Institute of Technology, showed the group a motion picture on "The Military Application of Jet Propulsion." Colonel Mesick described the three types of jet propulsion—rockets, turbo jets, and ram jets—and discussed the applications to which each of the three are put. Another motion picture entitled "Rubber," released by the Rubber Development Bureau, Washington, D. C., was also shown to the group.

Boston Sets 1949 Meetings

The Boston Rubber Group has announced definite dates for its 1949 meetings. The Spring Meeting will be held on March 25, the Fall Meeting on October 14 and the Winter and Christmas Meeting on December 16. All of the meetings will be held at the Somerset Hotel in Boston. An outing date will be announced in the future.

ASME RUBBER DIVISION SETS PROGRAM FOR FALL MEETING

The Rubber and Plastics Division of the American Society of Mechanical Engineers will hold two technical sessions on November 30 at the Hotel Pennsylvania in New York City, as a part of the annual meeting to be held November 28 through December 3. J. F. Downie Smith, Dean of Engineering, Iowa State College, is chairman of the Division, and D. H. Cornell of the B. F. Goodrich Research Center, is secretary.

The first session, which will begin at 9:30 A.M. on November 30, has the following papers scheduled for presentation:

Soft Rubber Bearings—Design Features and Methods of Application Under Conditions of Water Lubrication, A. Badner (Lucian Q. Moffitt).

Report on Friction Test on Flow Control of Continuous Film of Rubber Bearings, J. W. Stanley (E. J. Willis).

Nylon as a Bearing Material, D. B. Hanson (DuPont).

At the second session, at 2:30 P.M. on the same day, these additional papers are to be heard:

Frictional Characteristics of O-Rings with a Typical Hydraulic Fluid, L. E. Cheyney, W. J. Mueller, and R. E. Duval (Battelle).

Laboratory Testing of Rubber Bearings, J. R. Beatty and D. H. Cornell (Goodrich).

Advances in Rubber During 1948, Lois W. Brock, G. H. Swart, and E. V. Osberg (General Tire).

Advances in Plastics During 1948, E. L. Kropscott (Dow Chemical).

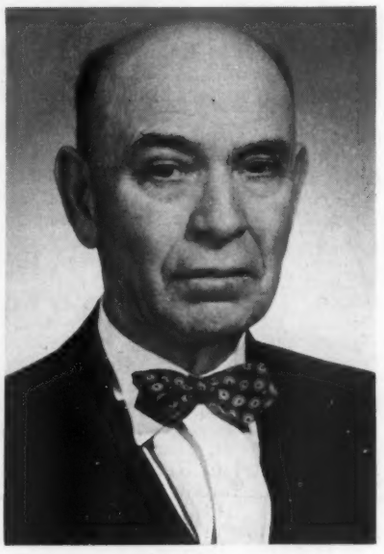
ATA Seeks Repeal of Tire Tax

A resolution asking for the repeal of excises on tires and tubes, motor vehicles, accessories, motor fuel and oil was adopted by the board of directors of the American Trucking Association, Inc., at the fifteenth meeting of the organization on October 20, in Washington, D. C. Herman D. Horton of Charlotte, N. C., chairman of Associated Transport, Inc., was elected ATA president for the next year. He succeeded Ted V. Rodgers of Scranton, Penna., first ATA president. Mr. Rodgers, who served since 1935, was named honorary board chairman for life. ATA directors also adopted a set of 12 principles governing leasing of trucks and planned to present them at interstate commerce commission hearings which were scheduled to begin on October 24.

Change Palatine Development Name

The name of the Palatine Development Co., which will produce Philblack type carbon blacks at a new plant in Avonmouth, England, has been changed to Philblack, Ltd. Arrangements are said to have been completed for the provision of the necessary capital, and plant construction will be started shortly. When completed, the plant is expected to turn out 20,000,000 pounds of Philblack A and 30,000,000 pounds of Philblack O annually.

Martin Retires From U.S. Rubber



Luther B. Martin

Luther B. Martin, technical director of tire production for the U. S. Rubber Co., retired on November 1, after thirty years of continuous service. A native of Allendale, S. C., and a graduate of the National Law School, Washington, D. C., Mr. Martin joined the rubber company in 1918 as a chemist in the Hartford Rubber Works, Hartford, Conn. He was subsequently made laboratory superintendent at the Providence Rubber Co. and in 1923 was appointed assistant factory superintendent of the Hartford Rubber Works. He was made factory manager there in 1929, and in 1930 was transferred to the company's Detroit, Mich., plant. Three years later he was appointed manager of tire quality and in 1944 was made assistant director of tire development for the company's tire division, involving five tire and tube plants located at Detroit, Eau Claire, Wis., Chicopee Falls, Mass., Los Angeles, Calif., and Indianapolis, Ind. In March 1945, he was appointed director of tire development with headquarters at Detroit, which was the position he held prior to the post of technical director of tire production. During the war, Mr. Martin was chairman of the Ordnance Advisory Committee of the Tire and Rim Association, a member of the war Production Board Tire and Tube Technical Consulting Committee, and a member of the Synthetic Test Committee of the Tire Industry. His services during the war were recognized by the Government with the Award of Merit for his work on synthetic rubber tires.

New Philblack Binder

The Rubber Chemicals Division of the Phillips Petroleum Co., Akron 8, Ohio, has made available a new loose-leaf binder for its Philback technical bulletins. All of the bulletins issued to date are included in the new binder. Several blank pages are provided to enable the user to jot down favorite Philback recipes and other pertinent data.

DISCUSSION ON THE VISTACS FEATURES BUFFALO MEETING

Approximately 75 members and guests of the Buffalo Rubber Group attended the October 19 meeting held at the Westbrook Hotel, Buffalo, N. Y. Principal speaker of the evening was Henry P. Pryor of the Advance Solvents & Chemical Corp. The subject of Mr. Pryor's address was "Vistac in Rubber."

Mr. Pryor explained that "Vistac" is a trade name for a series of relatively low molecular weight polybutenes of which Vistac 1, 2, and 4 are the chief members. The Vistacs are synthetic hydrocarbon polymers obtained by the catalytic polymerization of normal and branched chain butenes derived from petroleum. They consist primarily of homolgous branched straight chain hydrocarbons, and are completely saturated.

Data were presented illustrating the effect of Vistac on natural rubber and GR-S, as well as its effects on butyl rubber, neoprene, and Buna-N type rubbers. This was followed by a display and discussion of various articles of manufacture and the solution of problems in which the Vistacs played a vital role.

The speaker depicted the versatility of the Vistacs by a discussion of its present and future potential in the miscellaneous field as is currently demonstrated by uses in the surgical and industrial tape field, wax and asphalt modifications, in the paper, paint, cable and insulation industries, and more. The extreme resistance of the product to water vapor, gases and alkalies, the adhesive properties, the ability to flow at low temperatures, the non-toxic features, are among the properties spurring new thought and usage, Mr. Pryor said.

Appoints American Representative

Wm. Butler & Co. (Bristol), Ltd., Siverthorne Lane, St. Phillips, Bristol 2, England, has announced the appointment of the Coaltar Chemicals Corp., 420 Lexington Avenue, New York City, as American representative for the distribution of a wide range of coal tar chemicals of British manufacture. The Butler company, distillers of tar and petroleum since 1843, operates refineries at Crew's Hole and Gloucester, England. The Coaltar corporation will continue to carry on its regular business operations as heretofore.

Author's Correction

An error has been noted in the article "Comparison of the Carrying Capacities of Rough and Smooth Bore Oil Suction and Discharge Hose Under Simulative Service Conditions," by Messrs. Werkenthin, James, and Morris, which was published in the September, 1947, issue of RUBBER AGE. On page 696, the line which reads "P = pressure drop in pounds per square inch" should read "P = pressure drop in pounds per square foot." It is suggested that readers note this change in their copies.

EUROPEAN RUBBER RESEARCH DISCUSSED BY DR. L. A. WOOL

A talk on "Rubber Technology and Research in Western Europe," by Dr. Lawrence A. Wood, chief of the rubber section of the National Bureau of Standards, featured the October 26 meeting of the Washington Rubber Group at the Cosmos Club in Washington, D. C. Approximately 65 members and guests were in attendance.

With Chairman T. A. Werkenthin (Bureau of Ships) presiding, the minutes of the previous meeting were read and approved and a short report was given by the secretary-treasurer. It was then announced that a few changes had been made in the heads of various committees and that R. W. Hackett (Rubber Reserve) was now chairman of the Publicity Committee, T. R. Scanlan (Gates Rubber) of the Program Committee, and Richard Harmon of the Membership Committee. It was also announced that the next meeting of the group would be held on Tuesday, November 23.

Dr. Wood's talk was built around a number of interesting slides based on photographs he had taken during a recent three-month visit to Western Europe, during which he gave a paper at the International Rubber Conference in London. In all, he stated, he visited some twenty different laboratories engaged in one way or another with rubber research.

Showing some pictures of the building occupied by the French Rubber Institute (Institut Francais du Caoutchouc) in Paris, Dr. Wood stated that France was currently consuming rubber at the rate of almost 90,000 long tons a year. There is still a tire shortage in France, he added, which can in part be attributed to the fact that the government insists that some 40% of all tires made be exported. He also referred to some of the development work being done in the country on metal cord tires.

Dr. Wood then described some of his experiences in Switzerland, including visits to the universities at Basle and Zurich. Considerable research was in progress at these universities on both the crystallization phenomena of rubber and on stress-strain properties.

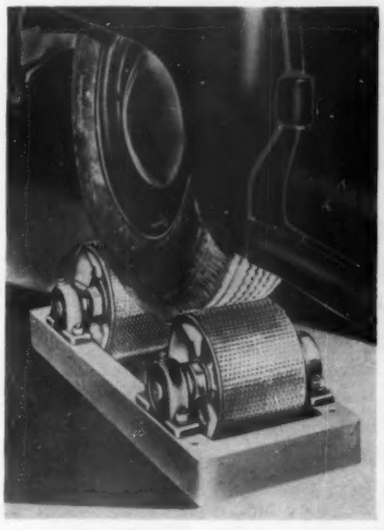
Turning to his visit to the Netherlands, the speaker told of his trips through the laboratories of both the Rubber Stichting (Rubber Foundation), which is supported at government level, and the Netherlands Rubber Institute, a technical organization supported by the Dutch rubber manufacturing industry. He also visited the laboratory of the Royal Dutch Shell Co., where work is being done on a new fiber which is a chemical derivative of natural rubber.

The concluding portion of the talk was concerned with Dr. Wood's extensive visit in England, where he witnessed the work being done by both the British Rubber Producers' Research Association and the Research Association of British Rubber Manufacturers. He was impressed with the fact that the library maintained by the latter organization boasts of some 71,000 papers on rubber and has an indexing system which numbers over 600,000 cards.

Other visits in England included the laboratories of the Dunlop Rubber Co., where, among other things, tires are tested at speeds of 400 m.p.h., and those of Imperial Chemical Industries, where considerable attention is paid to synthetic rubber. In concluding his talk, Dr. Wood told of the rubber courses given at the Northern Polytechnic and efforts currently being made to organize a National Rubber College.

Winter-Grip Tire Tread

The Goodyear Tire & Rubber Co. has introduced what is said to be a new and revolutionary tread treatment for tires now available to motorists for protection against the hazards of winter driving. Named "Winter-Grip", the tread is obtained by means of a device known as the Goodyear Tractionizer which mechanically pierces the tire tread, leaving



Shown is a Goodyear Tractionizer used for performing the new treatment on tire tread.

thousands of small holes to a depth of one-eighth inch to three-sixteenth inches. Complete treatment is accomplished by the Tractionizer, a mechanism consisting of two rollers. The rear end of the car is jacked up and each tire in turn is set down between the two rollers which are studded with hooked barbs one-quarter inch long. Powered by the car, the wheel is rotated, piercing the tread with a multitude of tiny perforations that expose sharp edges to grip the road. The company states that any tire other than one having less than one-sixteenth inch tread design remaining can be treated in this manner. The Winter-Grip treatment may only be obtained from Goodyear dealers.

The history, products and present activities of the Koppers Co. are outlined in a new sixteen-page booklet recently published by the company.

GILLILAND ADDRESSES NEW GROUP ON DEVELOPMENTS IN SYNTHETICS

The first meeting of the newly-established Division of the Chemistry of Rubber and Allied Substances, Northeastern Section, American Chemical Society, held on October 21 at the Massachusetts Institute of Technology, was addressed by Professor Gilliland of the Institute on recent developments in synthetic rubber manufacturing. Professor Gilliland stated that major improvements in syntheic rubber are awaiting the development of polymerization techniques more closely resembling the natural processes which take place in the rubber tree.

The speaker described the wartime-developed process for the manufacture of butadiene-styrene synthetic (GR-S), and outlined the characteristics of this material which render it inferior in some respects to natural rubber. He reported on various attempts to modify the original manufacturing process in order to obtain a product closer in its properties to natural rubber.

The most significant development in this direction, he said, has been the synthesis of so-called "cold rubber." This substance is manufactured in a manner very similar to that employed previously for GR-S, but polymerization is carried out at much lower temperatures. The resultant polymer, Professor Gilliland reported, is definitely superior to GR-S in its physical properties when compounded, but for general use it is still inferior to natural rubber compounded in the same manner. Further development in the technique of polymerization may lead to major improvements in GR-S type rubbers, the speaker concluded.

Virgin Heads Trenton Section

Carl W. Virgin, chief research chemist of the Vulcanized Rubber and Plastics Co., Inc., has been elected chairman of the Trenton, N. J., Section of the American Chemical Society, succeeding N. Richard Yorke of the St. Reg's Paper Co., Trenton, first chairman of the group. Newell A. Perry of the Thermoid Co., was named vice-chairman, and Francis G. Mendrey of H. N. Richards Co. and John J. De Munnik of the American Tile and Rubber Co. were re-elected secretary and treasurer, respectively. The new chairman, Mr. Virgin, joined the Vulcanized Rubber and Plastics Co. in 1943. For two years he was with the Mellon Institute for Industrial Research, Pittsburgh, Penna., and among the concerns with which he was connected were the Ellis-Foster Co., Montclair, N. J., and the Standard Register Co., Dayton, Ohio.

Buffalo Plans Christmas Party

The Buffalo Rubber Group has announced that plans are progressing for the annual Christmas Party. The party, dinner, and election of officers, will be held at the Hotel Westbrook, Buffalo, N. Y., on December 14. Dinner will be served at 6:30 p.m.

NAMES IN THE NEWS

H. M. BRUBACKER, formerly associated with the Philblack Division of the Phillips Petroleum Co., has joined the sales staff of the Sid Richardson Carbon Co.

LEONARD FORTUNE, formerly production manager of the Fremont Rubber Co., has joined the Clorox Chemical Co. at Cleveland, Ohio, in a similar capacity.

DR. GILBERT THIESSEN, formerly development manager of the Chemical Division of the Koppers Co., Inc., at Pittsburgh, Penna, has been named technical advisor for that division.

CHARLES N. WOODBURY, associated with the Hood Rubber Co., Watertown, Mass., since 1904, most recently as assistant export manager, has retired after forty-five years of service.

JAMES A. BRASWELL, JR., formerly senior compounder at the Memphis, Tenn., plant of the Firestone Tire & Rubber Co., has sailed for Bombay, India, where he will be chief chemist of the Firestone plant in that area.

C. W. STAACKE, formerly associated with the B. F. Goodrich Co. for 22 years, and one of the country's leading belt conveyor engineers. has joined Hewitt-Robins, Inc., as technical consultant and special assistant to THOMAS ROBINS, JR., president.

ARTHUR W. CARPENTER, manager of physical testing laboratories at the Akron plants of the B. F. Goodrich Co., has been loaned to the Government for service on the National Security Resources Board in Washington, D. C., for a period of three months.

DR. EDWARD WICHERS, formerly assistant chief of the Chemistry Division of the National Bureau of Standards, has been appointed division chief, succeeding DR. G. E. F. LUNDELL who has retired from active duty but will remain as consultant to the division.

EDWARD F. KIRIK, formerly sales engineer for the H. O. Canfield Co., has been appointed general sales manager of the Bond Rubber Corp., Derby, Conn.

JOHN A. ZELLHOEFER has been appointed sales manager of the Chemicals Division of the General Electric Chemical Department. He will be responsible for the sales of Glyptal alkyd resins, wire enamels, insulating varnishes and paints, silicones, etc.

J. E. TRAINER, vice-president in charge of production for the Firestone Tire & Rubber Co., is serving as chairman of the committee on engineering for President Truman's Conference on Industrial Safety.

C. E. BLANCHARD, formerly associated with the B. F. Sturtevant Co. in the design and sale of special drying equipment, has joined the staff of the J. O. Ross Engineering Corp. in a similar capacity, with headquarters in Boston, Mass.

RALPH LOTTES, associated with the Seiberling Rubber Co. since 1940 as a territory salesman, has been named sales manager of the Howatt Rubber & Supply Co., Inc., Cleveland, Ohio.

R. C. WITMORE, is now associated with the Better Monkey Grip Co. at Dallas, Texas, in the capacity of technical director.

FLEET PERRINE, formerly a field representative of the United Rubber Workers, CIO, has been appointed organizational director succeeding N. H. EAGLE.

PIERRE S. DUPONT III, descendant of the founder of E. I. du Pont de Nemours & Co., Inc., and manager of rayon tire yarn sales for the company, has been elected a director of the company.

OTTO L. SCHWENG, associated for the past four years with the Development Department of the General Aniline and Film Corp., as an economic specialist, has been appointed to the newly created post of director of market research for the Diamond Alkali Co.

B. M. HALPERN, president of the Bramley Machinery Corp., has departed for the British Isles and the Continent to investigate progress in dispersion-mixing, particularly in the rubber, plastics, paint and other chemically related industries.

F. SCOTT CARPENTER, JR., previously associated with the Grasselli Chemicals Division of E. I. du Pont de Nemours & Co., Inc., has joined the Special Carbon Blacks Section of the Research and Development Department of Godfrey L. Cabot, Inc., Boston, Mass.

R. G. JETER, one of Akron's leading attorneys, has been appointed general counsel of the B. F. Goodrich Co. He was graduated from Ohio State University in 1932.

DR. JAMES E. ABLARD, chemist at the General Tire & Rubber Co., has been awarded a certificate of merit from the Departments of the Army and Navy for his work during the war.

JAMES A. RAFFERTY, vice-president of the Union Carbide and Carbon Corp., has been awarded the Chemical Industry Medal for 1948 by the American Section of the Society of Chemical Industry, for his leadership in developing the billion-dollar synthetic aliphatic industry.

A. BOYD CORNELL, executive vice-president of the Hamilton Rubber Manufacturing Corp., with which he has been associated since 1918, has been elected a director of the Acme-Hamilton Manufacturing Corp., which operates both the Hamilton concern and the Acme Rubber Manufacturing Co.

HARRY P. SMITH, formerly New York district sales manager of the Mathieson Chemical Corp., has been made assistant general manager of sales. His headquarters will remain in the company's New York offices.

M. E. LERNER, editor of RUBBER AGE, has been appointed a member of the Executive Committee of the Rubber and Plastics Division of the American Society of Mechanical Engineers for a five-year term.

CECIL A. SMITH, assistant district sales manager of the N. J. Zinc Sales Co., has been named district sales manager. He will continue to make his headquarters in the Guardian Trust Building, Cleveland.

T. Spencer Shore, well-known industrialist and investment banker ,and formerly vice-president and treasurer of the General Tire & Rubber Co., has been elected president of the Eagle-Picher Co.

SAMUEL B. ELLIS, formerly associated with the export divisions of both the Goodyear Tire & Rubber Co. and the U. S. Rubber Co., has been named director of export sales for the Hamilton Rubber Manufacturing Corp.

SAMUEL BROERS, president of the Firestone International Co., recently left the United States for a two-month business tour of the Southwest Pacific which will include attendance at the formal opening of Firestone's new tire plant at Papanui, near Christchurch, New Zealand.

LESTER J. KOCH, export manager of the Witco Chemical Co., left the United States recently for an extended business trip to England and the Continent.

Hayes B. Robinson, formerly associated with the Kirkhill Rubber Co., is now associated with the Reeves Rubber Co. in charge of the Extrusion Department.

Robert B. Coleman, previously associated with the Pharis Tire & Rubber Co., has joined the W. J. Voit Rubber Corp. as assistant chemist.

VICTOR H. BODEN, associated with the Carbide and Carbon Chemicals Corp. since 1933, and district sales manager of the Philadelphia office since 1940, has been appointed Eastern Sales Manager with headquarters in Philadelphia.

Firestone has made available an informational release prepared in question and answer form dealing with Foamex, the company's foamed latex material.

INDEXING SERVICE OF RUBBER COMPOUNDS OFFERED BY NEW CONCERN

Something entirely new in the way of service to the rubber manufacturing industry, both in this country and abroad, is being sponsored by The Rubber Formulary, a new organization established in Bakersfield, California. The concern is offering an indexing service of rubber compounds, based on the punch card system. The Rubber Formulary is headed by Kathleen S. Rostler as editor.

A card has been designed by The Rubber Formulary for the service, which classifies rubber compounds by tensile strength, elongation, hardness, type of rubber hydrocarbon, and black or non-black filler. A number of marked spaces are also provided to be used by the subscriber who may be interested in classifying by other properties or ingredients. The card is being printed exclusively for the company by the Charles R. Hadley Company, Los Angeles, and is built around their 5 x 8 inch single punch Rocket card.

The service is offered as a yearly subscription and consists of monthly abstracts of rubber compounds published in the more important journals. The rubber compounds are reported individually on the cards, and the abstract consists of composition and physical properties of the compound, together with the original literature reference.

This method of recording and sorting rubber compounds was originally developed by a group of rubber chemists for their own use in compounding research. The system proved so versatile and adaptable to many applications that it appeared to merit extension into this service.

Designed for Quick Reference

The service, which is designed to permit quick location of any compound in the files without the necessity of cross-referencing, should prove of considerable interest to everyone whose work is concerned with rubber compounds. Technical papers dealing with the chemistry and technology of rubber contain a number of compounds for which physical properties are reported in the form of tables or graphs or both. These compounds constitute valuable information for compounders beyond the illustrative purpose for which the author has used them.

From the aspect of finding any of the compounds at a later time, however, the information is not readily available, but is scattered throughout the literature. Hunting through the literature to find compounds with certain desired properties is usually a fruitless task. The Rubber Formulary furnishes the service of recording, classifying and sorting these compounds in such a way that they are permanently available for quick reference.

Abstracts of compounds published in 1948 and subscriptions for 1949 are offered at present. If warranted by demand, abstracts of previous years will also be prepared.

Blank cards are also being offered for compounders interested in recording and filing compounds from their own records in the same manner so that they may be sorted at the same time as the compounds supplied by The Rubber Formulary.

A booklet describing the service in detail is available on request from The Rubber Formulary, 115 George Hay Building, 1612 Nineteenth Street, Bakersfield, California.

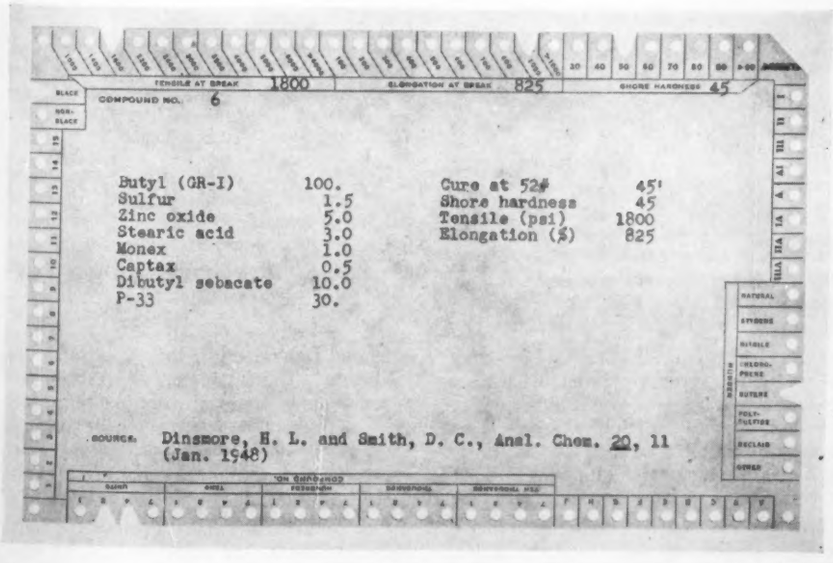
Background of Mrs. Rostler

Kathleen S. Rostler, editor of The Rubber Formulary, is the wife of Dr. Fritz Rostler, director of research and development of the Golden Bear Oil Co. She is a member of the American Chemical Society, of the ACS Rubber Division, and of Phi Kappa Phi.

Mrs. Rostler holds an A. B. degree from the University of Delaware, from which she graduated in 1937 with honors in course and distinction in chemistry. She has a master's degree in chemistry from Connecticut College at New London, where she majored in colloid chemistry and where she was a fellow and assistant in the department while earning her degree.

Kathleen S. Rostler

Mrs. Rostler entered the field of rubber chemistry in 1939 as assistant to the chief chemist of Wilmington Chemical Corporation in Wilmington, Delaware. During the five years she held this position, she was instrumental in setting up the laboratories for physical testing of rubber, she trained and supervised the technicians, and was in charge of the library, of literature abstracting, and of filing laboratory reports. From 1945 to 1947 Mrs. Rostler held the position of Associated Research Chemist at the Engineering Experiment Station of the University of Delaware, engaging in research on rubber.



Replica of punch card designed by The Rubber Formulary for recording and indexing rubber compounds.

Kolthoff Awarded Nichols Medal

For his world leadership in the development of modern analytical chemistry, Professor I. M. Kolthoff of the University of Minnesota has been awarded the William H. Nichols Medal of the New York Section of the American Chemical Society for 1949. Professor Kolthoff, a native of the Netherlands, is also noted for his extensive fundamental research in recent years on the emulsion polymerization process, key step in the manufacture of synthetic rubber. The Nichols Medal, one of the highest honors in chemical science, will be presented to Professor Kolthoff at a joint meeting of the New York Section and the American Section of the Society of the Chemical Industry at the Hotel Pennsylvania on March 11, 1949.

Dissolve Frazier Rubber Products

Frazier Rubber Products Corp., Carey, Ohio, by unanimous consent of its stockholders has elected to dissolve and terminate its affairs. A certificate of dissolution was filed in the office of the Secretary of State of Ohio on September 30, 1948.

SYMPOSIUM ON WIRE INSULATION FEATURES CONFERENCE PROGRAM

The 17th annual meeting of the Conference of Electrical Insulation of the National Research Council, held on October 27 through 29, at the National Bureau of Standards, Washington, D. C., featured a Symposium on Wire and Cable Insulation. A series of eight papers were presented at an afternoon technical session on October 27.

R. W. Atkinson, of the General Cable Corp., Bayonne, N. J., presented a paper entitled "High Voltage Cable Practice in Relation to Dielectric Theories." Mr. Atkinson said that the mechanism of electrical failures at power frequency is fairly well established and accepted. An analysis of the process helps to correlate the observed performance of cable insulation and to explain the underlying characteristics of the different types.

The speaker pointed out that the mechanism described is somewhat analagous to the reduction in strength of a glass rod or plate which is scratched or notched. Electrical insulation is thus "electrically brittle" in the sense that stress beyond the failure value in a limited region is propagated to ultimate failure of the entire wall.

The analogy holds even more closely to the mechanical fatigue failure under vibrating loads. Since the weakness of these regions is a function of their thickness in the direction of the electrical field, laminated insulation such as that made by winding of paper tapes owes its high practical value to the fact that the laminated construction limits the transverse dimensions of these flaws to a distance comparable with the individual layers of tape.

Effect of Soil Micro-Organisms

John T. Blake and Donald W. Kitchen, of the Simplex Wire & Cable Co., Cambridge, Mass., presented a paper on "The Effect of Soil Micro-Organisms on Rubber Insulation." The authors stated that the service life of most rubber insulated underground cables has been excellent. There have been a few cases of failure in control and communications caused by direct contact with the soil.

Such failures, said the authors, are characterized by discreet spots of low insulation resistance. Under laboratory conditions favoring microbial activity, failures have been produced in a few weeks resembling those found in cables after 10 or more years. Parallel tests in active soil, sterilized soil, and water proved the failures were caused by micro-organisms.

Insulation resistance is the most sensitive unambiguous criterion of failure of insulation in soil. It indicates microbial attack sooner than customary bacteriological methods. The authors discussed the resistance of various insulating compounds to micro-organisms, and noted that the probable mechanism of attack is oxidation by aerobic micro-organisms.

Apparent Density of Paper

"The Relation of the Dielectric Constant and Power Factor of Paper to Apparent Density," offered by Harold S. Endicott, of the General Electric Co., Bridgeport, Conn., was another paper presented at the symposium. Mr. Endicott stated that one of the problems encountered when evaluating the dielectric constant and power factor of either impregnated or unimpregnated paper is the variation in apparent density of the sheets.

It is important to know whether measured differences in the electrical properties are due to differences in sheet density or to differences in the fibers themselves. Paper may be considered to consist of paper fibers in series or in parallel with more or less air (or impregnant) or of some combination of series and parallel. Equations were given relating dielectric constant and power factor with density for both the series and for the parallel case.

Mr. Endicott presented data which showed that the series representation fits very well for both unimpregnated and for impregnated paper. The author stated that all of the paper tested was calendered. The series relation does not necessarily hold for uncalendered paper or hand made sheets.

Cable Noise Suppression

R. M. Pierce and V. Siegfried, of the American Steel & Wire Co., Worcester, Mass., presented a paper on "Noise Suppression in Coaxial Cables." The transmission of electrical impulses from a pick-up device to an amplifier is usually accomplished through a microphone cable which has metallic braid shielding to eliminate spurious impulses.

While this has been satisfactory in short lengths, the use of longer lengths has shown that pick-up of mechanical vibration or shock introduces serious problems where faithful transmission of the desired signal is the prime requisite. This is aggravated after severe abuse by the "noise" caused by broken strands of the shielding braid making intermittent contact.

The authors then discussed the origin of these disturbances, and noted that experience with the successful reduction of ionization in high-voltage power cable by use of semi-conducting material of physical characteristics similar to the dielectric, and serving as a bond between the dielectric and electrodes, suggested the use of the same construction for noise-free microphone cable.

Other Papers Presented

Other papers presented at the symposium included:

"Effect of Sudden Repeated Gas Pressure Releases on the Operating Characteristics of High Pressure Gas Filled Cables," by Joseph Sticher and Louis Meyerhoff, of the Detroit Edison Co., Detroit, Mich., and the General Cable Co., Bayonne, N. J., respectively.

"An Experimental Plastic Stop Joint for Extra High Voltage Gas Pressure Cables," by L. I. Komives, N. A. Kerstein, and J. D. Piper, of the Detroit Edison Co., Detroit, Mich.

"Cable Fault Location by One-Quarter Wave Length Resonance," by H. S. Slade, of the Okonite Co., Passaic, N. J.

"Surface Discharge Investigations on Luminous Sign Cables," by L. F. Roehmann, of the Anaconda Wire and Cable Co., Hastings-on-the-Hudson, N. Y.

News in Brief

According to recent reports issued by ORR the Port Neches GR-S plant operated by Goodrich Chemical led all other plants in the Government rubber program in accident free man-hours of work.

A new 20-page pocket-size booklet (No. 200-TEC-1077) explaining the essentials of power factor in industrial plants, and offering a digest of power factor calculation, has been published by the Electric Machinery Manufacturing Co., Minneapolis, Minn.

U. S. Rubber has increased the prices of its electrical wire and cable from 5 to 10% effective November 1. The increase was attributed to rising costs of labor and material.

A new three-story laboratory and office structure is now being built in Durban, South Africa, for Dunlop South Africa, Ltd., an associated company of Dunlop Tire & Rubber Co., Buffalo, N. Y.

The Electrical Wire & Cable Department of U. S. Rubber has published a 20-page catalog describing its line of latex insulated building wires and cables.

Pioneer Rubber Co., Willard, Ohio, has an order for a million "Shmoos," the character in the well-known L'il Abner comic strip. Tooling has been completed and Shmoo balloons will soon be rolling of the production lines.

A pamphlet on its "Bronco" wires and cables, which are neoprene-jacketed, has been issud by the Western Insulated Wire Co., Los Angeles, Calif. Special features are stressed in the pamphlet.

Exports of rubber, allied gums and manufactures from the United States in August amounted to $9,197,489, the lowest figure in many months. The decline was attributed chiefly to reduced shipments of truck and bus casings.

United Laboratories, Inc., Cleveland, has introduced Tampatch, a fast-drying floor patch designed especially for making rapid repairs, making it unnecessary to close off vital production areas, while repairs are being made.

One of the many uses foreseen for Geon polyblend latex, the colorless film recently developed by the B. F. Goodrich Chemical Co., is covering whitewall tires to protect them during shipment.

Moser with Kirkhill Rubber

William M. Moser

As briefly reported in our last issue, William M. "Bill" Moser, formerly technical director of the now defunct Pharis Tire & Rubber Co., Newark, Ohio, has joined the ranks of the Kirkhill Rubber Co. at Los Angeles, Calif. Born in Switzerland, Mr. Moser attended schools in that country and attained the degree of chemical engineer before coming to the United States. His early rubber training in this country was with the Gates Rubber Co. at Denver, Colorado, and later he became chief chemist for the Armstrong Tire & Rubber Co. in Natchez, Miss. He was also associated with the Enjay Company for a brief period after the war. Mr. Moser's chief hobbies are fishing and photography.

British Rubber for U.S. Stockpile

The European Recovery Program began paying visible dividends to the United States with the arrival on October 14 of 1,000 tons of British rubber on the Cunard liner *Parthia* for this country's stockpiling purposes. The shipment, consigned to the Treasury Department for the Munitions Board, is the first of a quantity of strategic items, including an expected 25,000 tons of rubber, as reported in a recent issue of RUBBER AGE, to be supplied by Great Britain under the reverse feature of economic cooperation agreements with E.R.P. countries.

Nopol Bicyclic Primary Alcohol

The Naval Stores Division of the Glidden Co., Jacksonville, Fla., has developed a new organic compound named "Nopol". Described as a bicyclic primary alcohol, Nopol is produced by condensation of beta pinene and formaldehyde. It is available in drum quantities or less from pilot plant production for chemical experimentation and development. Glidden's Naval Stores Division terms the new substance the only primary alcohol derived from the terpenes which is potentially available in large volume at low cost.

LABOR NOTES

Some 1,400 production workers at the Dayton Rubber Co. in Dayton, Ohio, walked out on strike on October 11. The Walkout was over a wage increase, the union asking for an 11-cent-an-hour increase and management offering 6½ cents. The strike was the first suffered by the company. Note: A strike settlement was reached on October 28 with the signing of a contract awarding a nine cent an hour across the board raise and an additional two cents to correct inequities.

A dispute over work standards disrupted production operations at the Detroit plant of the U. S. Rubber Co. on October 22. As a result of the dispute, the company suspended all production at the plant and sent home some 6,000 production workers.

Seiberling Personnel Changes

J. L. Cochrun, formerly vice-president in charge of sales for the Seiberling Rubber Co., Akron, Ohio, has been named executive vice-president of the company. Mr. Cochrun, associated with the company for 27 years, took over the post which had been vacant for several years. Succeeding Mr. Cochrun as vice-president in charge of sales was L. M. Seiberling who was formerly general sales manager. Mr. Seiberling has been with the company for 21 years and was elected a director in 1947 succeeding his father, the late C. W. Seiberling, a co-founder. Charles A. Reed, formerly assistant to the president, has been named to succeed Mr. Seiberling as general sales manager. Mr. Reed was one of the first three employees on the payroll at the company's founding and has been in the sales department in charge of various departments during most of his service with the company.

Appointments at Blaw-Knox

Edson W. Forker, associated with the Blaw-Knox Co., Pittsburgh, Penna., since 1927, and a vice-president of the Blaw-Knox Division in Charge of Process Equipment, has been named president of the Chemical Plants Division of the company. Mr. Forker has managed the Chemical Plants Division since its formation in 1939. At the same time it was announced that George E. Kopetz and Ralph E. Moser have been named vice-presidents of the company. Mr. Kopetz came to Blaw-Knox in 1939 and assisted in the organization of the Chemical Plants Division. Mr. Moser joined the staff of the division in 1942 to assume duties as manager of construction.

Hewitt Rubber is presently supplying seven different kinds of hose for oil well operations in the Gulf of Mexico where seven oil or gas producing wells have been discovered to date.

Simple and quick methods of installing Hewitt Rubber's patented "Twin-Weld" welding hose are told in a new descriptive pamphlet recently issued.

Blasius Appointed At Burgess

George F. Blasius

George F. Blasius, who resigned as vice-president and technical director of the Hercules Filter Corp. on September 16, has been appointd executive vice-president in charge of sales and new product development for the Burgess Pigment Co., Sandersville, Ga. Mr. Blasius will maintain his headquarters at new company executive sales offices at 64 Hamilton St., Paterson, N. J. The Burgess company is an affiliate of the Thiele Kaolin Co., producers of paper coating and filling clays. Burgess is presently constructing a new $300,000 plant adjoining that of Thiele Kaolin at Sandersville for the production of modified clays, mechanically and chemically treated, for the rubber, plastics, paper, paint, leather, chemical and other industries.

Cushioned Propeller Shaft Box

SKF Industries, Inc., Philadelphia, Penna., has developed an improved type of rubber-cushioned propeller shaft box which absorbs destructive vibrations occurring in trucks and buses operating at high speeds. The company states that the unit substantially reduces driver fatigue and maintenance problems by preventing the spread to a vehicle's chassis of vibrations caused by propeller shafts revolving at high speeds. The device, which supports the shaft joining the transmission to the rear axle, consists of a housing whose outer and inner rings are separated by an oil-resistant rubber cushion and a self-aligning ball bearing free to move lengthwise in the shaft box. The rubber cushion is "shot" between the two rings of the housing at high velocity. The rubber is held in place by mechanical friction, thus eliminating the need for vulcanizing. A metal labyrinth seal protects the bearing against dirt, dust and road splash.

Michelin Plant for Brazil

According to reports, authority has been granted to the French Michelin organization to construct a rubber factory in Brazil for the manufacture of tires and mechanical goods. The plant will be located in or near Sao Paulo and will have initial capacity for processing 500 tons of rubber a month.

NEW POLYMERS AUTHORIZED BY OFFICE OF RUBBER RESERVE, RECONSTRUCTION FINANCE CORPORATION

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Rubber Reserve, Reconstruction Finance Corporation, since publication of those in our previous issue. Procedures for the distribution and sale of these polymers will be found in our October, 1945, issue. Normally, experimental polymers will be produced only at the request of the consumers and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside if possible for distribution to other interested companies for their evaluation. The 20 bales when available will be distributed in quantities of one or two bales upon request to the Sales Division of Rubber Reserve or will be held for six months after the experimental polymer was produced unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received to warrant them.

X Number	*Manufacturing Plant*	*Date of Authorization*	*Polymer Description*
X-480 GR-S	General, Baytown	8-20-48	A mixture containing 75 ± 3 parts HMF black and 100 parts GR-S. Stabilized with 1.5% PBNA. Mooney equivalent to 40 ± 4 on the finished unpigmented polymer.
X-481 GR-S	U. S. Rubber, Borger	9-3-48	Copolymer of 71 butadiene—29 styrene charge ratio; made at 41°F., DDM modifier. Cumene hydroperoxide activated recipe with rosin soap. Shortstopped with ditertiary butyl hydroquinone. Stabilized with 1.25% BLE. Mooney 60 ± 5.
X-482 GR-S	Goodyear, Torrance	9-9-48	Copolymer of 72 butadiene—28 styrene charge ratio; made at 41°F. Cumene hydroperoxide activated recipe with rosin soap. Shortstopped with dinitrochlorobenzene. Antioxidant 1.25% BLE. Mooney 60 ± 5.
X-483 GR-S	Goodyear, Torrance	9-9-48	Same as X-482 GR-S except that Mooney is 50 ± 5.
X-484 GR-S	Goodyear, Houston	9-8-48	Same as GR-S produced continuously except 4.0 parts soap and slightly lower conversion.
X-485 GR-S	Copolymer, Baton Rouge	7-23-48	Copolymer of 71 butadiene—29 styrene charge ratio; made at 41°F. Cumene hydroperoxide activated recipe. Shortstopped with dinitrochlorobenzene. Mooney 60 ± 5.
X-486 GR-S	General, Baytown	9-16-48	A mixture containing 50 ± 2 parts reinforcing furnace black and 100 parts GR-S. Stabilized with 1.5% PBNA. Mooney equivalent to 45 ± 4 on the finished unpigmented polymer.
X-487 GR-S	Goodyear, Houston	9-9-48	Regular GR-S except stabilized with 1.5% R-2015.
X-488 GR-S	U. S. Rubber, Borger	9-29-48	Copolymer of 72 butadiene—28 styrene charge ratio; made at 41°F. Cumene hydroperoxide activated recipe with Dresinate 214. Shortstopped with ditertiary butyl hydroquinone. Antioxidant 1.25% BLE. Mooney 60 ± 5.
X-489-SP GR-S	U. S. Rubber, Naugatuck	9-24-48	A copolymer of 95 butadiene—5 styrene charge ratio; made at 122°F. 43 parts Dresinate 731, 1.25% BLE antioxidant. Mooney 55 ± 5.
X-490 GR-S	U. S. Rubber, Borger	9-30-48	A mixture of 50 parts Philblack 0 and 100 parts low temperature polymerized GR-S. (Cumene hydroperoxide activated recipe made at 41°F., DDM modifier. Shortstopped with ditertiary butyl hydroquinone. Antioxidant 1.5% BLE. Mooney 38 ± 4 on the unpigmented polymer.)
X-491 GR-S	Firestone, Akron	9-29-48	Copolymer of 55 butadiene—45 styrene charge ratio; made at 150°F with 6.3 parts K wood rosin soap and 0.7 parts Resin 731 soap. Antioxidant 0.5 parts Stalite. Salt—alum coagulation. Mooney 50-75. Maximum volatile matter 0.75%.
X-492 GR-S	Goodyear, Torrance	10-4-48	Copolymer of 72 butadiene—28 styrene charge ratio; made at 41°F. Cumene hydroperoxide activated recipe; 4.0 parts potash ORR soap. Shortstopped with dinitrochlorobenzene. Antioxidant 1.25% BLE. Mooney 55 ± 5. Slightly lower conversion.
X-493 GR-S	Goodyear, Houston	9-29-48	Regular GR-S except shortstopped with hydroquinone and stabilized with 1.5 parts R-2019G. Mooney 60 ± 5.

N. Y. Public Library Centennial

The New York Public Library, which came into existence with the establishment of the Astor Library in 1848 and which is observing its 100th birthday this year, will formerly commemorate this event in an Anniversary Week celebration to be held from November 22 through 29. An outstanding exhibition of historical and literary interest will be a showing of 100 treasures of the New York Public Library. This exhibition will draw upon all collections of the Library and will include some of the rarest and most precious possessions of the institution.

AMF Acquires Oakes Mixer

The American Machine & Foundry Co., New York City, has acquired the manufacturing and leasing rights to the Oakes Continuous Automatic Mixer. Placed on the market by the E. T. Oakes Corp. of Douglaston, Long Island, N. Y., a year ago, the equipment is said to employ an entirely new and revolutionary principle of mixing viscous materials wherein the operation is uninterrupted from the beginning of the blend to depositor. To date the mixer has been used primarily for foods; however, application of this new mixing method to rubber is under study.

Compton Heads Military Research

Dr. Karl T. Compton, president of the Massachusetts Institute of Technology, has been appointed chairman of the Research and Development Board of the National Military Establishment, succeeding Dr. Vannevar Bush who resigned to devote himself principally to the presidency of the Carnegie Institution of Washington. Both men collaborated closely on scientific developments during the wartime period. Dr. Compton has resigned as president of MIT but continues as chairman of the Institute. Dr. James R. Killian, Jr., has been chosen to be the Institute's tenth president.

CASING PRODUCTION IN AUGUST RISES 4.35% ABOVE JULY TOTALS

A total of 6,962,556 automotive casings were produced during August, a rise of 4.35% above the July figure of 6,672,146, according to the Rubber Manufacturers Association. Total passenger casings produced during August were 5,768,614 units, compared with the 5,516,349 units produced in July. Truck and bus casings produced during August totaled 1,193,942 units, against the 1,155,797 units produced during July.

For the second straight month, shipments exceeded production. During the month of August a total of 7,834,883 automotive casings were shipped. Of these, 6,575,964 were passenger casings, and 1,258,919 were truck and bus casings. In July, a total of 7,865.944 casings were shipped, and of these 6,559,-976 were passenger casings and 1,305,-968 were truck and bus casings. As a result of large shipments of casings which were attributed to the record number of vehicles on the road, inventories have declined 8.54%. August inventories totaled 9,335,119 units, compared with the 10,206,580 units available as of July 31.

Production of passenger and bus and truck tubes during August totaled 6,-638,552 units. This compared with 5,749,632 units produced during July. A total of 6,917,140 tubes were shipped in August, against the 6,807,414 tubes shipped in July. As of August 31, 8,532,660 tubes were in producers' stocks compared with 8,760,344 units as of July 31.

Kayser Heads Columbian Carbon

Election of Carl E. Kayser as president of the Columbian Carbon Co. was announced by the company on October 17. Mr. Kayser, who joined the company in 1946 as executive assistant to the president and recently served as vice-president, succeeds the late Reid L. Carr in his new post. At the same time the company announced that Robert M. Hillas was elected as chairman of the board and T. R. Goebel as a vice-president. The office of chairman of the board has not been occupied in recent years. Mr. Hillas has been actively connected wtih the operations of Columbian Carbon for the past 15 years as a member of the board and has been a vice-president since 1940. Mr. Goebel was previously associated with the Shell Oil Co.

Odlivak Opens Purchasing Office

Michael Odlivak, formerly associated with Miller Products Co., Inc., of New York City, has begun individual operations as a specialty and industrial purchasing and sales agent for all rubber and plastics products with offices at 220 Central Park South, New York 19, N. Y. and at 2513 Frankford Avenue, Philadelphia 25, Penna. Mr. Odlivak attended City College of New York where he studied chemical engineering.

AKRON STREET RESURFACED WITH ASPHALT-RUBBER MIXTURE

Workmen pouring the powdered rubber into the hot asphalt.

Additional information on the re-surfacing of an Akron street with an asphalt-rubber combination, as originally reported in the October issue of RUBBER AGE, has been made available by the Goodyear Tire & Rubber Co., which supplied the rubber to the city. In resurfacing a section of Exchange Street, city officials acting on a plan suggested by Goodyear called for a new "hot-mix" combination that included synthetic or finely powdered rubber blended with conventional asphalt black top commonly used on city pavement.

Engineers were of the opinion that the new mix would give a more nearly waterproof surface than regular black top application. It is expected to be more resilient, longer-wearing and more resistant to cracking in cold weather. Contractor for the resurfacing was the Thorpe Construction Co., of Akron. The firm mixed the rubber in a finely-powdered form with asphalt, blending the materials at a temperature of around 300°F. The accompanying illustration shows workmen pouring the powdered rubber into the hot asphalt preparatory to resurfacing a section of the street.

The formula used called for 1,200 pounds of finely powdered rubber to 3,000 gallons of asphalt, plus crushed rock ordinarily present in all hot-mix solutions. This formula produced 180 tons of mixture. Small sections of Akron were paved with the new material about a year ago, and to date, have stood up well.

Goodyear Film Available

A new patriotic movie entitled "A Letter From America," which was produced by the Goodyear Tire & Rubber Co. as part of its 50th Anniversary activities, has been made available for public showings, P. W. Litchfield, chairman of the board, announced recently. In his announcement, Mr. Litchfield declared that Goodyear, as a company, figures only incidentally in the movie. The purpose of the film, he said, is to promote "Americanism."

Form Zerillo Products, Inc.

The business of the late Frank Zerillo, which since his death has been conducted by members of his family under the trade name of Estate of Frank Zerillo, is now being conducted by the same persons under the new corporate name of Zerillo Products, Inc. Headquarters of the company remain at 300 Sheffield Ave., Brooklyn, N. Y. A. J. Zerillo is president of the new firm.

Warren Moulded Products Formed

The Warren Moulded Products Co., Warren, Ohio, has been formed for the manufacture of molded rubber mats. Robert S. Meersmans, Albert E. Chanson and George H. Gentithes, all members of a Warren law firm, were named as incorporators of the company in Columbus, Ohio, recently. The new firm will construct a plant in Warren in the near future which will employ approximately 30 persons. Incorporation papers call for 250 shares of stock at $100 par value.

Carroll Named Sales Agents

The Sid Richardson Carbon Co., Fort Worth Texas, has named R. E. Carroll, Inc., Trenton, N. J., as sales representatives for the Middle Atlantic Area. The Carroll company will continue to serve the Middle Atlantic area from their Trenton headquarters, and will maintain warehouse stocks in that city.

RHEOLOGICAL CONFERENCE HELD ON AN INTERNATIONAL SCALE

The International Rheological Conference, which was held at The Hague, Holland, from September 21 to 25, attracted approximately 235 delegates from some 13 different countries. About 50 papers were presented, many of them concerned with the viscosity of high polymer solutions and the effect of filler particles. Five papers were directly concerned with rubber and plastics. Data on these papers as reported by the *India Rubber Journal* follows:

Of the five papers on rubber and plastics, four were on the measurement of plasticity, the first being that in which E. B. Atkinson and H. Nancarrow described a novel extrusion plastimeter which can be attached to the well-known Hounsfield Tensometer. They used the extrusion principle for their thermoplastics because it simulates the practical extrusion process and provides a rod of the material which can be examined for surface finish. They concluded that a number of thermoplastics have negligible slip at the extruder walls and hence, for these materials, data of fundamental value can be obtained. As little as 5 g. of the thermoplastic can be tested, producing about 1 foot of ⅛-inch diameter rod.

G. G. H. Hamm and A van Rossem described an interesting rotating-cylinder plastimeter which can be used for fundamental research studies. With it they demonstrated that there is no "yield-point" with masticated rubber. This leads to the conclusion that all the materials investigated must be considered as viscous and not as plastic materials, suggesting that, in the final analysis, the measuring apparatus should be described as a viscometer and not a plastimeter. On the point of terminology and leaving the question of the yield-point, the writer agrees with the appeal, made in the discussion by Mr. G. Martin, that the term plastimeter is preferable to that of plastometer.

Hamm and van Rossem's device is not suitable for routine use because the determination of stress / deformation-rate curves is tedious, the shear rates are small, and some slippage occurs at the metal surfaces despite their being roughened. Allavena, however, pointed out in the discussion that this could be overcome by increasing the hydrostatic pressure on the rubber. Of the materials which they tested, Thiokol A showed almost pure Newtonian flow.

Discussion of Different Instruments

R. G. Newton, J. R. Scott, and R. W. Whorlow discussed various compression-type plastimeters from the point of view of their ability to discriminate between rubbers of similar plasticity, and they showed that none of these plastimeters is equally useful for all types of rubbers. For example, the Williams and Defo types seem to be best for testing masticated smoked sheet, provided fairly low temperatures are used, whereas the Hoekstra "rapid-plastimeter" and a high temperature are much better for testing remilled black-loaded rubbers. It is of interest to note that this valuable factory-type instrument, whose inventor was shot by the Germans for his part in the resistance movement, is again in production in Holland.

The other paper on "plasticity" testing of rubber, by R. Harper, is only of incidental interest to rubber technologists, because vulcanized rubber samples were used to test the ability of persons to judge "firmness."

The remaining rubber paper was that by Mr. W. G. Wren. He discussed the hardening or softening action of certain amino-compounds and showed how relatively small changes in the chemical structure produce enormous changes in the plasticity. In addition, phenolic compounds will inhibit the softening caused by heating in air and by peptizing agents; here, again, small changes in structure produce great differences in effect.

Some of his results are of both practical and theoretical importance. For example, the addition of 0.5 per cent of MBT to masticated rubber will cause softening, but subsequent removal of the accelerator causes the rubber almost to regain its original hardness. The inference is thus that peptizing agents can have two effects, one reversible, and the other irreversible.

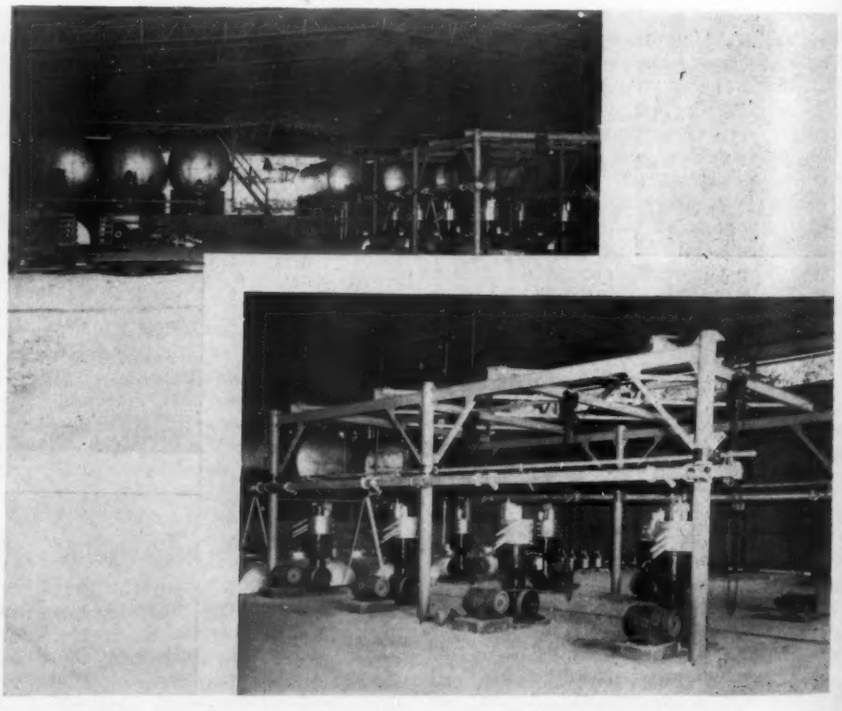
A stimulating demonstration was given by K. Weissenberg of extreme examples of so-called "anomalous" liquids. Using those rubber solutions which are now employed for catching of rats and mice, he showed that, if stirred, they climb up the rod and empty the breaker! When they are rotated in a dish under a loaded plate, they well up in the center and form a column which will raise the plate by an inch or more!

More Acetophenone Available

Carbide and Carbon Chemicals Corp., New York City, has announced large scale production of acetophenone. The chemical (phenyl methyl ketone) has previously been available only in small lots, but can now be furnished in tank car quantities at a new low price. Commercial availability of acetophenone, it is said, will stimulate its application in many new fields. The combination of the benzene nucleus and the ketone group suggests many possibilities for its use as a raw material in the manufacture of rubber chemicals, dyestuffs, pharmaceuticals, and insecticides. Phenyl methyl carbinol also will be put on the market by the company in the near future.

Appointed U. S. Latex Agent

The appointment of the General Latex & Chemical Corp., of Cambridge, Mass., as exclusive agent for the sale of its latex in the United States was recently announced by Harrisons & Crosfield, Ltd. The latter organization was among the pioneers to establish *Hevea brasiliensis* as the basis of the Malayan rubber industry and today controls 10% of that country's rubber industry, acting as management agent for some 120,000 acres and selling directly from its own holdings. Harrisons & Crosfield (Malaya) Ltd. recently completed the construction of a large bulking plant and special docking facilities in Malaya to facilitate tanker shipments of latex to America and Europe. The bulking plant provides facilities for the centrifuging, chemical control and grading of latex.



The photograph, above left, represents a general view of the Petaling Factory showing centrifuges and latex reception tanks on the right, bulk storage tanks on the left. The photograph, lower right, depicts centrifuging machines in the bulking plant, Petaling Factory of Harrisons & Crosfield.

STANDARD COMPOUNDING SAMPLES ADDED BY BUREAU OF STANDARDS

As an outgrowth of the successful use of standard samples of rubber compounding ingredients in the Government synthetic rubber program, the National Bureau of Standards has added seven of these standards to the long list of standard samples supplied to industrial and scientific laboratories. The requirements of the specifications for Government synthetic rubbers are now predicated on the use of these standard samples for stress-strain testing of synthetic rubbers. The samples are also available to manufacturers of rubber products for use in connection with the procurement of raw materials, process control, and inspection of product quality.

The use of standard samples of compounding ingredients for the testing of rubber was inaugurated in 1943 by the Committee on Specifications for Synthetic Rubbers, under the sponsorship of the Office of Rubber Director and Rubber Reserve Company, now the Office of Rubber Reserve. This was a vital part of the Government synthetic rubber program, which resulted in outstanding improvements in precision and accuracy of testing in the Government synthetic rubber plants. The uniformity of synthetic rubber production in recent years has been made possible by the improvements in testing rubber.

Orders for these materials should be sent to the National Bureau of Standards, Washington 25, D. C., accompanied by payment in advance. Remittances should be payable to the National Bureau of Standards. Shipments will be made express collect unless otherwise specified. The following standard samples are available in air-tight metal containers except No. 376 which is packaged in glass (when ordering, specify both number and name of sample):

Standard Sample No.	*Name*	*Weight per Pkg. grams*	*Pkgs. per Carton*	*Price per Package*
370	Zinc oxide	2000	8	$1.65
371	Sulfur	1000	20	0.60
372	Stearic acid	600	1	1.20
373	Benzothiazyl disulfide	600	40	1.20
374	Tetramethyl-thiuram disulfide	600	1	2.25
375	Channel black	8000	4	3.50
376	Light magnesia	140	1	0.85

Silkysol and Silcyl Fabrics

Heribert, Inc., New York 14, N. Y., has introduced two new plastics materials which are said to have almost unlimited application. "Silkysol" is a rayon fabric with a unique waterproof plastic coating. Entirely odorless, the material is said to have extreme strength, is resistant to dirt, grease, acids and sunlight, and is non-fading. It will not crack or peel for the coating is securely bonded to the fabric base. Silkysol can be treated like any other fabrics for fabrication purposes. The second material, "Silcyl," is of the same coated material, laminated to vinyl sheeting with a layer of Fiberglas insulation sandwiched between. The material can be fabricated in the same manner as Silkysol and in addition is heat sealable.

Restfoam Latex Foam Pillow

A new pillow, made entirely of latex foam and described as a boon to allergy sufferers since there are no feathers or conventional pillowing materials used in its manufacture, has been introduced by the Hewitt Restfoam Division of Hewitt-Robins, Inc., Buffalo, N. Y. The

pillow, a development of the Hewitt Comfort Institute, is a companion to the Restfoam mattress introduced last Spring. The company claims that it is not necessary for the sleeper to plump it into shape for there is nothing to pack or mat down. The pillow will keep its shape and is light and cool.

Firestone Bead Loosening Tool

The Firestone Tire & Rubber Co., Akron, Ohio, has developed a tool that will exert a concentrated pressure up to 10,000 pounds per square inch, and makes possible on-the-job changes of giant earth mover tires. The tool, named the "Bead Loosening Tool," is adjustable for use on 20 to 33 inch rim sizes, and may be operated in either a horizonal or vertical position. The company claims that one man, using the Bead Loosening Tool, can easily force the steel fingers between the tire bead and the rim flange by means of a long lever arm. A mechanical screw, operated by a rachet lever, then exerts up to five tons of pressure on the bead through the tapered fingers to force the bead away from the bead seat.

September Consumption Decreases

New rubber consumption during September was estimated at 90,214 long tons in a report released by the Rubber Manufacturers Association. The September figures indicate a reduction of 2.19% from August when 92,236 tons were used. Natural rubber consumed in September was estimated at 51,400 tons, down 3.07% from the previous month when the reported consumption was 53,028 tons. Total synthetic rubber consumed amounted to 38,814 tons, down 1.01% from August when 39,208 tons were used. Consumption of reclaimed rubber was estimated at 21,949 tons in September as compared with 22,441 tons in August, a reduction of 2.19%.

Hardesty Offers Data Sheets

Three data sheets containing information vital to processors of chemical products using fatty acids and fatty acid by-products have been made available by W. C. Hardesty Co., Inc., Los Angeles, Calif. Fatty acid components of the most commonly used fats and oils are listed in the first of the series, which also shows iodine value, saponification number, titre and refractive index of each of the fats and oils listed. A color standards comparator, showing comparative color values indicated by the designations used in seven different systems of color standards, is also offered by Hardesty. Temperature conversion tables give conversions to both Fahrenheit and Centigrade from bases of —100 to 1100. All three charts are available in durable cover stock for posting in convenient plant locations or use as desk reference material. The charts may be obtained from the company at its Los Angeles, New York or Dover, Ohio, offices.

Faull Rejoins General Latex

Dr. J. H. Faull, Jr., on leave of absence from the technical staff of the General Latex and Chemical Co., Cambridge, Mass., during the recent war, has rejoined the company as director of research. Dr. Faull, a graduate of Harvard University, entered the rubber field during the 1930's when he joined the staff of the Firestone Tire & Rubber Co. in Akron. He subsequently joined General Latex and left that organization on a leave of absence to become technical superintendent of the Office of Rubber Reserve GR-S plant at Baytown, Texas. He also served as head of the Scientific Section, Boston Branch of the Office of Naval Research, and on numerous Government technical committees incidental to the national synthetic rubber program. As part of his new duties, Dr. Faull will continue his association with the Baytown plant and the ORR. Dr. Faull is a member of numerous technical and fraternal societies.

Kalabond RM-1 Bonding Agent

The General Tire & Rubber Co., Akron, Ohio, has developed a rubber-to-metal adhesive that contains no halogen and which is said to have definite anti-corrosive properties. The new adhesive, called "Kalabond RM-1," also provides bonds that will sustain elevated temperatures. Specifically designed for GR-S compounds, the bonding agent works equally well with natural rubber if a GR-S tie cement is used in conjunction with the rubber-to-metal adhesive. Kalabond RM-1 is based on a specially designed rubbery polymer having a high degree of compatibility with GR-S plus an additive that forms a bridge between the polymer and metal surface. The bond formed is positive and chemical in nature. The polymer, which contains unsaturation, vulcanizes during the curing operation with sulfur and accelerator being obtained from the base compound.

FINANCIAL NEWS

Boston Woven Hose & Rubber Co.

Year Ended August 31: Net income of $1,008,796, which is equivalent to $11.21 per share of common stock, and compares with 1,312,848, or $14.74 per share of common stock for the preceding year. Sales for the year amounted to $19,083,823, against $17,053,284 last year. Total current assets as of August 31, 1948, were $6,749,205, of which $2,651,408 was inventories, $1,523,559 in accounts receivable, $954,832 in cash, and $1,704,867 in Government securities. Total current assets as of August 31, 1947, were $7,107,268. Total current liabilities as of August 31, 1948, were $1,506,134, of which $609,497 was in accounts payable, and $896,637 in accrued taxes. As of August 31, 1947, total current liabilities were $1,729,362.

U.R.W. Issues Financial Statement

The United Rubber, Cork, Linoleum & Plastic Workers of America, CIO, has issued a statement of assets and liabilities for the year ended June 30, 1948. Total cash on hand and in banks amounted to $377,671, total investments amounted to $398,069, of which $305,000 was in United States War Bonds and $86,073 in the URWA Home Association, and $27,194 in furniture and fixtures. Total liabilities amounted to $10,222. The total net worth of the union was established at $795,892.

Hewitt-Robins, Inc.

Third Quarter: Net income of $155,469, which is equal to 56 cents a share each on 278,714 shares of common stock outstanding. The report stated that factory shutdowns for vacations accounted for a drop in sales and earnings during the early part of the third quarter, but that in September, operations and profits were at a rate exceeding the average for the second quarter.

American Cyanamid Co.

Nine Months to September 30: Net income of $10,353,762, including equity in undistributed earnings of associated companies, which is equal to $3.78 a common share, compared with $7,199,544, or $2.63 a share, last year. Net sales for the period amounted to $171,865,979, against $155,099,434 for the corresponding period last year.

Electric Hose & Rubber Co.

Year to August 31: Net income of $483,794, which is equal to $3.86 a share, compared with $645,096, or $5.04 the year before. Net sales for the year totaled $10,144,596, against $9,559,833 last year.

U. S. Rubber Co.

Nine Months to September 30: Net profit of $15,216,798, which is equal to $6.42 a share after provisions of $11,624,657 for income taxes and $907,264 for foreign exchange losses. Net sales for the nine month period amounted to $431,930,181. Comparison figures for a nine month period last year are not available, since the company did not issue quarterly reports last year.

General Cable Corporation

Nine Months Ended September 30: Net income of $3,193,891, which is equal to $1.37 a share each on 1,914,010 common shares, which compares with $4,627,400, or $2.09 a share each on 1,898,610 common shares, for the corresponding period of 1947.

National Automotive Fibres, Inc.

Nine Months: Net profit of $2,049,459, which is equal to $2.15 a common share on sales of $36,123,543, which compares with $1,451,914, or $1.52 a share on sales of $28,421,415 last year. Totals include figures for wholly-owned subsidiaries of the company.

Denman Tire & Rubber Co.

Six Months to June 30: Net profit of $108,156, or 49 cents each on 195,075 common shares, against $115,857, or 53 cents a share last year. Net sales for the period totaled $1,157,484 against $1,901,684 for the corresponding period last year.

Electric Auto-Lite Co.

Nine months ended September 30: Net profit of $7,828,374, which is equal to $5.24 a share, and compares with $7,816,946, or $5.23 a share for the corresponding period of 1947. Sales for the first nine months totaled $147,708,318 against $136,297,867 for the first nine months of 1947.

Rome Cable Corporation

Six Months to September 30: Net income of $508,938, or $1.23 a share each on 380,476 common shares, which compares with $554,263, or $1.35 a share each on 379,660 common shares for the corresponding period last year.

General Tire has won the "best of industry" direct mail award for 1948 in the rubber industry given by the Direct Mail Advertising Association. The company received its award for the *General Tire Farm News Digest*. Merit awards were received by Seiberling and the Goodyear Tire & Rubber Co. of Canada.

Cabot to Build U. K. Plant

Godfrey L. Cabot, Inc., Boston, Mass., has announced plans for the formation of Cabot Carbon, Ltd., which will shortly begin construction of a new twenty-million pound annual capacity carbon black plant near Liverpool, England. The Cabot company will supply approximately one-half the capital required for the new project. The balance of Cabot Carbon, Ltd., capital requirements will be supplied by British investors. Louis W. Cabot, grandson of the company's founder, has been appointed resident manager. Mr. Cabot is presently connected with the company's operations in the Southwest. Recent action by the Economic Cooperation Administration approved Cabot plans as the first ECA guaranteed American investment under the Marshall Plan. Up to $850,000, the amount of the ECA guaranty, will be insured by them for conversion from Sterling to dollars and will be utilized for the return of income to the American investors. Recent technological developments making possible the production of carbon black from liquid hydrocarbons near points of carbon black consumption, will make the new Cabot Carbon, Ltd., project possible. Approximately 60 persons will be employed in the operation of the new plant.

Pharis Liquidation Approved

Stockholders of the Pharis Tire & Rubber Co., Newark, Ohio, at a special meeting on October 27, voted to liquidate the company's operations in that city. Furber Marshall, president of the company, announced at that time that directors of the company will hold further meetings to complete the liquidation plans. The Newark plant has been closed since May 1 because of wage and seniority disputes with the U.R.W., as reported in the September issue of RUBBER AGE. Closing of the Newark plant has resulted in the discontinuance of the company's automobile passenger tire line. Bicycle tire and tube manufacture will be continued at the Carlisle Tire & Rubber Co. plant at Carlisle, Penna., while brakes and molded materials will continue to be produced at the company's Ridgeway, Penna., plant. However, the Pharis board has been empowered to dispose of both the Carlisle and Ridgeway plants.

Safety Award For Seiberling

For exceptional service to safety in featuring child safety in its 1948 advertising, the Seiberling Rubber Co., Akron, Ohio, was presented with the National Safety Council's Award of Merit at ceremonies at the National Safety Congress held in Chicago, Ill., on October 18. The presentation was made by Ned H. Dearborn, Council president, to J. P. Seiberling, president of the company, at the conclusion of a speech by Mr. Seiberling which keynoted the school and college session of the Council's 36th annual convention.

CONNECTICUT HEARS HOLBROOK ON ACCELERATORS IN RUBBER

The November 5 meeting of the Connecticut Rubber Group held at the Tuttle Music Shed, Naugatuck, Conn., was addressed by Frederick L. Holbrook of the Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn. The subject of Mr. Holbrook's address was "Accelerators and Anti-oxidants and Their Application in the Rubber Industry."

Mr. Holbrook noted that the first accelerators known were basic inorganic materials including basic lead carbonate magnesia and litharge. Inorganic accelerators have been superseded by organic accelerators because the latter are more powerful and give vulcanizates with all-around improved quality and durability.

The speaker noted that the commercially important organic accelerators may be classified into two main groups. Group one includes those accelerators with organic bases and covers aromatic and aliphatic amines, guanadines and aldehyde amines. Group two covers the sulfur and carbon disulfide reaction products of organic bases and includes dithiocarbamates, thiuram sulfides, thiazoles and, derivatives, and xanthates.

In industrial importance the thiazoles rank first in supplying the bulk of the primary acceleration used today, said Mr. Holbrook. Next in line come the guanadines, thiurams and dithiocarbamates all of which are used chiefly as secondaries with thiazoles.

Antioxidants in Rubber

From the very beginning, said Mr. Holbrook, the rubber industry has been concerned with the problem of improving the aging characteristics of its products. Before the discovery of vulcanization, manufactured goods deteriorated so rapidly that the future of the industry was in doubt. The advent of vulcanization turned the tide but by no means solved the entire problem.

Investigation has shown that the deterioration of vulcanized rubber is an oxidative process, observed the speaker. Heat, light, mechanical working and the presence of soluble salts of such metals as copper and manganese all accelerate the process.

Certain chemicals when added to rubber in relatively small amounts have been found to inhibit oxidation and greatly prolong the life of the vulcanizates. Such chemicals are known as antioxidants. Their commercial use started in the 1920's and constitutes one of the most important milestones in the progress of the rubber industry.

The antioxidants, said Mr. Holbrook, may also be divided into two groups. Group one includes the secondary aromatic amines, and group two the phenolic bodies. The amine antioxidants constitute the larger and more important group commercially. The phenolic materials are less effective but are comparatively non-staining.

Discoloration and staining by antioxidants are due to their oxidation to colored compounds. The oxidation products of the phenolic bodies are less intensely colored than those of the amine antioxidants and therefore do not produce as much color in the rubber, said the speaker, who then went on to show and discuss the type formulae of the most common accelerators and antioxidants as well as their structural formulae.

Twombly Named Vice-President

W. F. Twombly

W. F. Twombly, associated with the Witco Chemical Co. since 1946, and previously assistant director of the Chemicals Bureau of the War Production Board, has been named vice-president in charge of manufacturing for the company. His headquarters will be at the company offices at 295 Madison Avenue, New York City. Witco's manufacturing facilities were recently augmented by the completion of a specialty asphalt plant at Perth Amboy, N. J. This new plant supplements asphalt plants in Chicago and Lawrenceville, Ill. Increased production facilities for metallic stearates have been installed in the Brooklyn, N. Y., and Chicago plants and a new, larger plant is now in operation in Chicago for the production of paint dryers. Other manufactured products include Sunolite, an anti-sun checking wax; Monty wax; rust preventives; sound deadening mastics; and automotive undercoatings.

Wingdale Acquires WAA Plant

The Wingdale Chemical Corporation, wholly-owned subsidiary of the D. H. Litter Company, Inc., David H. Litter, president, has purchased from the Reconstruction Finance Corporation through the War Assets Administration the twenty-acre plant and 105-acre limestone quarry on Route 22 in Wingdale, N. Y., it was announced by the Home Title Guaranty Company, which insured title.

Valued at $1,500,000, the plant will produce filler and pigment extenders for the paint and varnish, linoleum, artificial leather and rubber industries. It includes a one-story finishing building measuring 200 by 60 completed several months ago, and other buildings and equipment.

SEVEN PAPERS OFFERED AT SEMINAR ON HIGH POLYMERS

The 1948-1949 lectures on the chemical and physical properties of high polymers, given by the nation's leading scientists in this field, continue the series of seminars which have been presented for the past three years at the National Bureau of Standards, Washington, D. C.

The program, arranged under the chairmanship of Dr. Robert Simha of the Division of Organic and Fibrous Materials, consists of seven lectures, two of which have already been offered. On October 7, G. Gee (B.R.P.R.A.) spoke on "Dielectric and Mechanical Properties at High Frequencies", and on November 4, F. O. Schmitt (Massachusetts Institute of Technology) spoke on "Some Structural and Chemical Properties of Polystyrene."

Papers still to be presented include the following:

January 6: Rheological Properties of Polystyrene, by R. S. Spencer, Dow Chemical Company.

February 24: Some aspects of dynamic rubber-like elasticity, by A. W. Nolle, University of Texas.

March 3: Reactions of Free-Radicals with Hydrocarbons, by E. W. R. Stacie, National Research Council.

April 7: Variables which Influence the Properties of Chemical Rubbers Prepared by Emulsion Polymerization, by C. F. Fryling, Phillips Petroleum Company.

May 5: The Chemistry of some Derived Polymers of the Vinyl Series, by W. O. Kenyon, Eastman Kodak Company.

Unicolor Colorant Available

The Unicolor Division of Westchester Plastics, Inc., 326 Waverly Avenue, Mamaroneck, N. Y., has announced a new colorant for vinyl, polyethylene and Geon extrusions. Named "Unicolor," the product is said to embody an entirely new principle of coloring. It consists of granules of color saturated resins which possess exactly the same qualities as the uncolored plastics with which they are mixed. The granules are said to form a molecular bond with the uncolored plastics. Westchester claims that the resultant product has 100% uniform coloration, is blister and blemish-free, and possesses unchanged physical and chemical properties.

Latex Insulated Flooring

Newcastle Industries, Inc., 300 West 56th St., New York City, has introduced a new type of flooring made up of kiln dried hardwood boards an inch wide, a fourth of an inch thick, and insulated on all four edges by a latex-filled strip of non-skid fiber material. The same insulating material forms a base for the square, and effectively keeps dust and dirt from coming up between the boards. Called Castle Square Flooring, the cushioned backing is said to make for greater comfort, better soundproofing and further insulation.

CANADIAN NEWS

The Rubber Association of Canada, the office of which is in Toronto, was incorporated under a Dominion Charter on March 17, 1920. The charter members were seven men prominent in the rubber industry of that time, namely, C. H. Carlisle, of the Goodyear Tire & Rubber Co. of Canada, Ltd.; John Westren, of the Dunlop Tire & Rubber Goods Co. Ltd.; C. N. Candee, of Gutta Percha & Rubber Ltd.; V. van der Linde, of the van der Linde Rubber Co. Ltd. (now extinct); A. D. Thornton, of the Canadian Consolidated Rubber Co. Ltd. (now the Dominion Rubber Co. Ltd); W. H. Miner, of the Miner Rubber Co. Ltd., and F. E. Partridge of the F. E. Partridge Rubber Co. Ltd. (now extinct).

Most of the leading personalities of the early years of the Association have either passed on or retired from active participation in the industry, but W. H. Miner can boast the remarkable record of having been a director of the Association every year since its incorporation and is its president at the present time.

The objects of the Association as set forth in its charter are:

(a) To promote in all lawful ways the commercial interests of the members of the corporation, and to secure the advantages to be obtained by mutual co-operation.

(b) To acquire and disseminate information concerning trade conditions at home and abroad, credits and other matters of interest.

(c) To stimulate social intercourse among those connected with the rubber industry and commerce, and in general for the promotion and welfare of the rubber industry.

The two principal classes of membership in the Association are (a) Firm and (b) Affiliated. The former is open to any firm, corporation, or individual directly engaged in the rubber industry in the Dominion of Canada. Any firm, corporation, or individual engaged in the manufacture or sale of materials, machinery or supplies largely used by the rubber manufacturing industry is eligible for the latter.

The Association rapidly grew in membership and soon developed into an organization truly representative of all major branches of the Canadian rubber industry. As such, it was in a position to collect and compile statistics on inventories, production and sales of rubber products to assist the industry to correlate supply and demand. It became the accepted meeting place for the discussion of problems common to the industry, and the recognized two-way channel of communication between the industry and Government.

During the last war, the value of such an organization in the rubber industry, not only to the industry but to the community at large, was proven beyond question. It is no exaggeration to say that had the Rubber Association of Canada not existed, it would then have been necessary to create one. It was through the Association that the Rubber Control of the Department of Munitions and Supply secured the experienced staff to operate its multifarious controls over rubber production and distribution, invaluable impartial advice from the industry on the organization of its war effort, and skilled technicial assistance in the solution of the innumerable problems created by the shortage of natural rubber and the necessity of resorting to the new and untried synthetic rubbers.

It is an historic fact that the Canadian rubber industry did an outstanding job for Canada and her Allies during the war and no small part of the credit for its performance must be given to the wholehearted co-operation which the Rubber Association was able to enlist immediately on behalf of the Rubber Controller.

With the end of the war, the activities of the Rubber Association returned to a more normal basis, but it continues to assist the Canadian rubber industry to conduct its business in an efficient manner to the ultimate benefit of Canadians generally.

Edward Barringham, president, Barringham Rubber & Plastics, Ltd., Oakville, has announced the appointment of Albert C. McCoy as vice-president in charge of sales and production, MacKenzie Robinson as secretary-treasurer, and C. Vaughan as assistant secretary-treasurer. Both Mr. McCoy and Mr. Vaughan have been with the company for several years.

In the fall of 1946, Barringham commenced an expansion program involving the erection of a new two-story building, the installation of new machinery and equipment, and the rearrangement of production lines designed to increase the volume and diversification of products. The company is a large manufacturer of rubber and plastic sheeting.

The expansion program is nearing completion and it is expected that all of the new machinery and equipment will be installed this fall and full production is expected by the end of the year.

Canadian tire manufacturers are at a loss to account for the recent rumors which have spread throughout the Dominion with regard to a growing shortage of tires. The rumors have even indicated that a return to rationing is pending or at least a "freeze" order of some kind. Both Trade Minister C. D. Howe and Greig B. Smith, manager of the Rubber Association of Canada, have issued statements denying the rumors, but they still persist. According to some of the rumors, tires are again being channeled into military programs.

REPORT U.S. AND RUSSIAN BIDS ON CURRENT CEYLON RUBBER CROP

Reports that the United States was competing with the Soviet Union to purchase a large proportion of Ceylon's rubber crop have been substantially confirmed by Ceylonese officials. Officials stated that negotiations were in progress in Colombo, Ceylon, and in London for the sale of the current crop. The Prime Minister of Ceylon, Don Stephen Senanayake, is presently in London, and is personally supervising the negotiations.

Interest in the United States bidding has been heightened by the fact that recently the Soviet Union offered to purchase from Ceylon not only this year's crop, but next year's as well. Ceylon officials in London would not discuss the Soviet offer in detail, but said that no final decision had been made.

George C. S. Corea, recently appointed Ceylonese ambassador to the United States, stated recently upon his arrival in New York that his country's rubber crop would go to the highest bidder. He asserted that there were some Communist Party members in the Ceylon Parliament, but that they were not particularly significant.

Ceylonese officials in London stated that their decision on the rubber crop would be governed by three main factors: the price offered in relation to the world price; long range trade possibilities; and the world situation. The United States last year bought 25,000 tons of Ceylon's total rubber crop of 90,000 tons. This year, with the crop falling off to an estimated 80,000 tons, the United States in the first eight months of this year has purchased 34,000 tons from Ceylon.

Adipol 10A and D.I.O.P.

Ohio-Apex, Inc., Nitro, West Va., has announced the commercial production of two new plasticizers under the trade name of Adipol 10A and D.I.O.P. These two new plasticizers are di-iso-octyl adipate and di-iso-octyl phthalate, respectively. The company states that Adipol 10 A is a primary plasticizer for most resins and imparts permanent flexibility, is comparable in every respect to Adipol 2EH, and may be used for the same purposes. D.I.O.P., the company claims, is comparable to dioctyl phthalate (di-2-ethylhexyl phthalate) plasticizer and may be used for the same purposes.

Monsanto Settles Disaster Suit

Stockholders of the Monsanto Chemical Co., St. Louis, Mo., were advised recently that the company's claims for loss resulting from the Texas City disaster have been settled for $17,321,000. Company officials stated that the consummation was preferable to long and costly litigation. The settlement represented a compromise between the company and underwriters on the valuation of the property, the amount of loss and on the interpretation of some of the clauses in the policies.

GOODYEAR'S 50TH ANNIVERSARY CELEBRATION FEATURES TALKS

An increased rate of production by industry and labor is the only way that America can support its world and domestic obligations while maintaining or bettering its standard of living, said E. J. Thomas, president of the Goodyear Tire & Rubber Co., during the celebration of the company's fiftieth anniversary held recently in Akron. Mr. Thomas told 1,700 assembled Goodyear executives that the average annual gain of 3.5% in productivity prior to 1941 has not been maintained since the war.

The company, he said, has actually had decreases. Every governmental brake of regimentation or control must be removed, he continued, to realize full utilization of productive effort. Mr. Thomas noted that in Goodyear's fifty years of operation, the company has received about nine billion dollars of revenue from its customers. Of that amount, 2.6 billion have gone into wages and more than $4 billion into materials. Of the balance, $720 million have been paid in taxes, $270 million for plant replacements, $755 million for operating expenses, $193 million to stockholders, and $244 million retained in the business.

P. E. H. Leroy, Goodyear vice-president in charge of finance, told the officials the company's current ratio of current assets to current liabilities of six-to-one, $300 million to $50 million, is the same as shown on the first balance sheet, $6,000 to $1,000, fifty years ago. This was purely coincidental, he noted, stating that the company has not maintained this ratio through the years. He said the common stock of the company is currently earning at the rate of $12 a share with a dividend rate of $4 while $8 goes back into the business. He placed the value back of each share of Goodyear common stock as $95 a share compared with the stock market value of less than half this amount.

P. W. Litchfield, chairman of the board, in greeting the company officials at the opening celebration ceremonies, paid tribute to F. A. Seiberling, 89 year old rubber industrialist, who in 1898 founded the organization with his brother, the late Charles W. Seiberling.

Tire Manufacturers Dwindle

W. F. Bloor, chief statistician and economist for the company, in an address entitled "The Rubber Industry—Its Markets, Future and Opportunities," stated that since 1898, more than 600 tire manufacturing companies have been founded in the United States. Today, only 25 active producers are left. These 25 companies have a rated capacity of 362,000 tires of all types daily. According to Mr. Bloor, Goodyear is first in capacity with 84,000 tires daily, U. S. Rubber is second with 82,000, and Firestone is third with 60,000.

During its fifty year history, Goodyear has become the seventeenth largest manufacturing company in the United States, and ranks twelfth among the largest employers. In tracing the company growth, Mr. Bloor noted that the company leads the American rubber industry with these firsts: renewal volume; original equipment market; and public preference.

Other highlights of Mr. Bloor's talk, illustrated with colored slides, covered the fact that in the last fifty years the United States has produced 100 million cars and trucks of which 38% are still in use; 54% scrapped and 8% exported. In comparison, foreign countries have produced 24 million motor vehicles. Passenger and truck registration continues to increase, he said. This year, trucks will total 6,700,000 and cars 32,000,000. Forty-two per cent of the cars on the road today are 10 years old or older.

Mr. Bloor stated that in this country, Goodyear serves 25% of the passenger tire market, 25% of the truck tire market, and 35% of the farm tire market. The company does business in every one of the 3,000 counties of the United States, whereas smaller companies concentrate on the big city areas.

Tire production in the United States reached a record 100 million last year, and will drop to about 86 million this year, Mr. Bloor estimated. The estimated production for the next five years will increase from 81 million in 1949 to 85 million in 1953.

Goodyear foreign plant production has reached 68 million tires, or 15% of the 450 million tires to date. Foreign plants have steadily increased their tire production from only 5% in the 1909-18 period to 20% of the total in the 1943-48 period. The company has production facilities in 14 countries, Firestone in 9, and U. S. Rubber in 4.

Mr. Bloor further stated that while rubber consumption in the United States reached a peak last year with 1,122,000 long tons, a new high wil be set this year in world consumption due to foreign countries stepping up their demand. The government is continuing to stockpile natural rubber. In case of another emergency it is hoped to have at least 20% natural rubber to spread over the multitude of rubber products, the speaker said.

Overseas Trade Noted

A. G. Cameron, vice-president and general manager of Goodyear Foreign Operations, Inc., stated that principal expansion of the Goodyear company in the years to come might well be in the foreign field. Mr. Cameron was of the opinion that in those countries where Goodyear operates one factory, two or three may be required. This was attributed to the economic and cultural growth of most of the nations in the world.

F. T. Magennis, vice-president of Goodyear's export company, reported that the firm has 21 foreign subsidiaries, 144 wholesale distributors and thousands of dealers abroad. The speaker said that the company is currently manufacturing 21,000 tires a day outside the United States, and is operating nine belt presses.

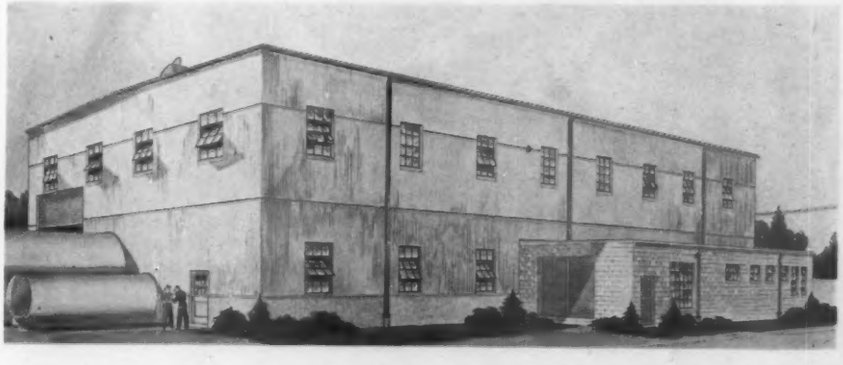
R. S. Wilson, Goodyear's vice-president in charge of sales, insisted that there was still plenty of room for expansion and pioneering in the automobile world. Mr. Wilson observed that as more roads are built throughout the country, the greater will be the expansion in the automotive field.

Totes Pocket-Weight Overshoes

Pocket-weight overshoes, under the trade name of "totes," are currently being manufactured by the So-Lo Works, Inc., Loveland, Ohio. Made of latex, the new overshoes are extremely light in weight and can be stretched to fit several sizes of shoes. They are being made for men, women and children. The women's totes are styled in satin black, and lined in red, brown or white, and are furnished in a Pliofilm bag for carrying in purses. The men's totes are brown and black, reversible to match any shoes, and are supplied in a waterproof pouch for carrying in pockets. The totes are nationally distributed to the shoe trade by Roth, Rauh and Heckel, Inc., of Ripley, Ohio.

Casto Firms Adjudged Bankrupts

After many months of attempted reorganization, both the Casto Corporation, of Marietta, Ohio, and the Casto Corporation, of Parkersburg, West Virginia, have been adjudged bankrupts by the District Court of the United States for the Southern District of Ohio. G. H. Butt is the referee in bankruptcy. A creditors' committee is being organized.



An architect's conception of the new building now being constructed as an addition to the plant of the B. F. Goodrich Co. in Tuscaloosa, Ala. The structure is designed for lining tank cars and other vessels used in the transportation of chemicals.

LOS ANGELES NEWS

The nominating commtitee of the Los Angeles Rubber Group has announced the following slate of candidates for 1949: *Chairman,* C. H. Churchill (Sterling Rubber); *Associate Chairman,* E. C. MacLaughlin; *Vice Chairmen,* R. D. Abbott (C. P. Hall), G. A. Steinbach (Atlas Sponge Rubber); *Secretary,* T. W. Andrews (H. M. Royal), A. J. Hawkins (DuPont); *Treasurer,* L. E. Budnick (Ohio Rubber); R. A. Lees (American Anode). Candidates for three posts of director are C. S. Hoglund (Goodyear), F. C. Johnston (Caram Mfg.), Herman Libkind (Western Insulated Wire), D. C. Maddy (Harwick Standard), George Miller (Voit Rubber), R. A. Morath (Naugatuck), Mason L. Paine (Firestone), W. E. Shawger (California Rubber Products), and R. L. Short (Kirkhill Rubber). The election is to be accomplished by letter ballot and results will be announced at the Christmas Party on December 3.

The board of directors of the Los Angeles Rubber Group met on October 18 at the Mayfair Hotel. At this meeting the following members were elected: A. W. Colwell (Franklin Rubber); William J. Keefe (C. L. Duncan); John J. Tyner (Dow-Corning); Paul A. Krider (McNeil Machinery); Thomas B. Keenan (Plastic & Rubber); and Louis Watz (Lamb Rubber).

Harry Keller, formerly associated with the B. F. Goodrich Co. in Akron, has joined the Kirkhill Rubber Co. as chemist.

Bill Von Der Reith, well known in rubber circles, has announced the opening of the Vonellen Date and Gift Shop and Mobiloil Service Station, Claremont, Calif.

The Fall Golf Tournament of the Los Angeles Rubber Group was held at the Hacienda Country Club, La Habra Heights, on Friday afternoon, October 8. Prizes were won by Wilbur Johnson (DuPont) for low gross, Miles Reinke (Reinke & Amende) for the longest drive, and Al Pickard (Braun Corp.) for the fewest number of putts. The event was well attended and an excellent time was enjoyed by everybody.

R. W. Johnson of Rubber Products, Inc., has announced the purchase of the interests of Jacob Horn & Co.

Ellay Rubber Co., formerly located in Pacoima, has moved to 1312 East 12th St., in Los Angeles. A. P. Bruce, one of the partners in this firm, was formerly associated with the Lamb Rubber Corp.

Frankenhoff Corporation Formed

The formation of a new corporation exclusively devoted to research, development and distribution of non-metallic minerals was announced recently by C. A. Frankenhoff, President of the new organization. The company, known as the Frankenhoff Corporation, specializes in high quality diatomaceous earth products for use in the rubber and other industries. A. G. Frankenhoff is Vice-President of the corporation. Both the Frankenhoffs bring to the organization a broad base of experience in the manufacture, processing and distribution of non-metallic minerals, particularly diatomaceous earth. Offices of the Frankenhoff Corporation are located in the Chrysler Building, New York. The phone number of the new organization is ORegon 9-3194.

Members and guests of the Los Angeles Rubber Group pictured at the October 5 meeting. Leonard Firestone (front row center) acted as host.

Diamond Expands Technical Service

The Diamond Alkali Co., Cleveland, Ohio, has announced the creation of a new Technical Service Division headed by Walter C. Bates as manager and Dr. George F. Rugar as assistant manager. The new organization is designed to cover what the company describes as "all phases of service work connected with the sale and use of Diamond-made alkalies, co-products, and derivative specialty chemicals." While the newly-formed division has been set up as an integral part of the research-development organization located at the company's Painesville, Ohio, plant, it will function as a separate unit manned by technical personnel recruited from the company's Pure Calcium Products Division, the Research Product Development Group, and technically trained personnel previously associated with the Sales Department in Cleveland. Mr. Bates was previously manager of the company's Pure Calcium Products Division. Dr. Rugar has been with the company since 1944.

G-E Chemical Department Changes

In a series of personnel changes at the Chemical Department of the General Electric Co., Pittsfield, Mass., Robert L. Gibson, formerly manager of the Plastics Division of the Chemical Department, was named assistant general manager of the department. Harry K. Collins of the Schenectady, N. Y., plant, and John L. Murphy of the Pittsfield plant were named to managerial posts of the Plastics Division and Chemicals Division, respectively. Dr. Charles E. Reed, formerly of the Schenectady plant, has been named engineering manager of the Chemical Department.

Hewitt Appoints Distributor

Expanding its sales outlets to cover the important lumber industry, the Hewitt Rubber Division, Hewitt-Robins Incorporated, of Buffalo, has appointed the Industrial Supply Company, 1647 North Second Street, Albuquerque, New Mexico, as a distributor in the New Mexico area. The Industrial Supply Company carries a complete stock of Hewitt hose and belting.

OBITUARIES

Mahlon J. Rentschler

Dr. Mahlon J. Rentschler, director of research and general manager of Barium & Chemicals, Inc., Willoughby, Ohio, died on October 25 at his office in Willoughby of a heart attack. Dr. Rentschler was 66 years old. Born in Centreport, Penna., he received a bachelor of science degree in 1904 and a master of science degree in 1908 from Pennsylvania State College. He also attended Goettingen University in Germany and in 1909 received the degree of doctor of science. In 1910, Dr. Rentschler was appointed director of research at the Oakland Chemical Co., New York. In 1915, he went with U. S. Rubber, where he worked in the research laboratories. In 1916, Dr. Rentschler, with W. J. and Albert Jeavons and Edward Heyner, formed the J. H. & R. Products Co. in Willoughby. He was named general manager and headed the research laboratories. In 1943, the company became Barium & Chemicals, Inc. Dr. Rentschler was chairman of the Cleveland section of the American Chemical Society in 1927 and in 1946. He served as honorary chairman this year.

Latham H. Conger

Latham H. Conger, member of an historic Akron family and contributor to the growth of the rubber industry in that city, died on October 21 at his home in Akron at the age of 70. Mr. Conger finished college at Kenyon, Ohio, and after working with several railroads, including the New York Central, he returned to Akron in 1910 to take a position with the Diamond Rubber Co. He was later associated with the B. F. Goodrich Co., and the Goodyear Tire & Rubber Co. in executive positions. Mr. Conger left the rubber business in 1924 to enter the automobile field and organized the Overland-Akron Co. He served as its president until retirement. Mr. Conger was a member of Masonic groups, including the Knights Templar, and he belonged to the Akron City Club. Services were held on October 24 at the Billow Funeral Home in Akron, with cremation in Cleveland, Ohio. His wife, two sons and a daughter survive.

George C. Gillies

George Clark Gillies, president of the Belmont Packing & Rubber Co., Philadelphia, Penna., died on September 8. Mr. Gillies had been president of the company since 1930. A native of Scotland, Mr. Gillies lived in Canada for some time, and came to the United States about 20 years ago. Services were held on September 11 with interment in Hamilton, Ontario, Canada.

Lawrence A. Matelik

Lawrence Andrew Matelik, associated with the technical department of the Kirkhill Rubber Co., Los Angeles, Calif., died on September 30 at the age of 43. Mr. Matelik was born in Queens, New York, on August 31, 1905, and was graduated from Columbia University with the degree of Bachlor of Science in Chemistry in 1927. Prior to his coming to California he was technical superintendent of the Paragon Rubber Co., Easthampton, Mass., from 1933 to 1940. From 1940 to 1943 he was plant manager of the Aetna Rubber Co. of Cleveland, Ohio. Mr. Matelik arrived on the west coast in 1943 and became plant manager of the Sierra Rubber Co., Huntington Park, Calif., a position he held until 1946, when he joined Kirkhill. During the last two years of his life he acted as a consulting technologist to the rubber industries of Southern California. Mr. Matelik was a member of the American Chemical Society, the Kiwanis Club and the Los Angeles Rubber Group. His wife and son survive.

Kendall Marsh

Kendall Marsh, president of the Baker Castor Oil Co., died on October 11 at his home in New York. He was 56 years old. Born in Kansas City, Mo., Mr. Marsh succeeded his father as president of the company on January 14, 1931. The company, which has plants in Bayonne and Jersey City, N. J., Los Angeles, Calif., and extensive interests in Brazil, developed from castor oil many products used in the rubber, paint and textile industries and in the protective coatings field. Mr. Marsh was a member of the State Chamber of Commerce of New York and the Bankers club, and a former director of the National Lead Co. His son survives.

Salvatore Chiappinelli

Salvatore Chiapinelli, owner of the General Insulated Wire Works, Providence, R. I., died on October 4 at St. Joseph's Hosiptal in Providence at the age of 75. He was also the owner of the S. Chiappinelli Jewelry Co., and president of the S. Chiapinelli Real Estate Co., both of Providence. Mr. Chiappinelli was a trustee of Holy Ghost Roman Catholic Church of Providence, and was a fourth degree member of the Knights of Columbus. Born in Teano, Italy, he immigrated to this country in 1895 and had lived in Providence for more than 50 years. Two sons and five daughters survive.

Republic Supply Co., Houston, Texas, has been named distributor of industrial rubber products for Goodyear.

Offer Technical Bulletins

The Netherlands Indies Rubber Research Institute, of Buitenzorg, Java, has resumed the publication of its well-known communications (bulletins), many of which are printed in English. Among some of the more recent bulletins in English are the following:

Determination and Occurrence of Iron in Crude Rubber, by G. J. van der Bie (Communication No. 42).

Determination of the Rubber Content of Hevea Leaves, by G. J. van der Bie (Communication No. 43).

Mixing Latex and Portland Cement: Experiments with Indoor Flooring, by G. J. van der Bie (Communication No. 45).

A Comparison of Different Types of Rubber Obtained from the Same Field Latex, by G. J. van der Bie (Communication No. 46a-46b).

Organic Analysis of Hevea Latex. IX. Some Details of the Mainfractions, by R. F. A. Altman (Communication No. 51).

Natural Coagulation of Hevea Latex, by R. F. A. Altman (Communication No. 52).

Fresh Hevea Latex, A Complex Colloidal System, by L. N. S. Homans and G. E. van Gils (Communication No. 67).

Many of these bulletins are reprints of original data published in various rubber journals, including *India Rubber Journal* and *Rubber Chemistry and Technology*. Communication No. 67 is the paper delivered by Dr. van der Bie at the recent Rubber Technology Conference in London, England. Copies of the bulletins listed above may be secured without cost from the Institute.

Tire for Jet Bombers

A new 56 x 16 airplane tire, especially designed for use on jet bombers, has been perfected by the Frank G. Schenuit Rubber Co., Baltimore, Maryland. Made necessary by the exceedingly high landing and take-off speeds of jet-propelled aircraft, the tire contains 1½ miles of bead wire, 113 miles of nylon thread (cable), uses 240 pounds of air pressure, and will carry a load of 60,000 pounds per tire. The load is two-thirds of the gross weight of a modern Pullman car. The Frank G. Schenuit Rubber Co., which was founded in 1912 by the late Mr. Schenuit, is now under the management of Roy C. Neely as president and treasurer, Edgar H. Spilman as vice-president and production manager, and Miss Eileen Coffay as secretary.

Armstrong Sues Rubber Union

The Armstrong Tire & Rubber Co., of Natchez, Miss., has filed a $500,000 suit against the United Rubber, Cork, Plastic and Linoleum Workers of America (CIO), its Local 303, and eight members. The suit, filed on October 31 in the United States District Court at Vicksburg, charged that a 76-day-old strike at the Natchez plant was a breach of contract and had caused a $500,000 loss due to a complete shutdown of the plant.

...for the Rubber Industry

WITH ONE CONTROL UNIT

or the new "Package Type" Unit

Greater employee efficiency, lower maintenance costs and increased production can be yours with a properly engineered central dust collecting system. Nationally-known plants such as that of the large rubber processing concern shown above, select Parsons consistantly for all their dust problems. Each of these Oval Bag dust arrestors handle 40,000 cubic feet of air per minute continuously, without shut-down.

Parsons' dust collecting systems are the accepted standard for collecting carbon black, talc and all types of rubber dust.

Introducing the new

Dust Control Unit

For collecting dust from individual machines, or from a small group of points where dust is localized in a more concentrated area, the Parsons "GEM" Dust Collector (left) is recommended. This small, compact unit, designed for quick installation, has ample filter cloth to maintain uniform suction. It has proved it's effectiveness in many kinds of rubber plant operations and in scores of other industries.

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CREATIVE ENGINEERS

Parsons MANUFACTURERS ENGINEERING CORP.

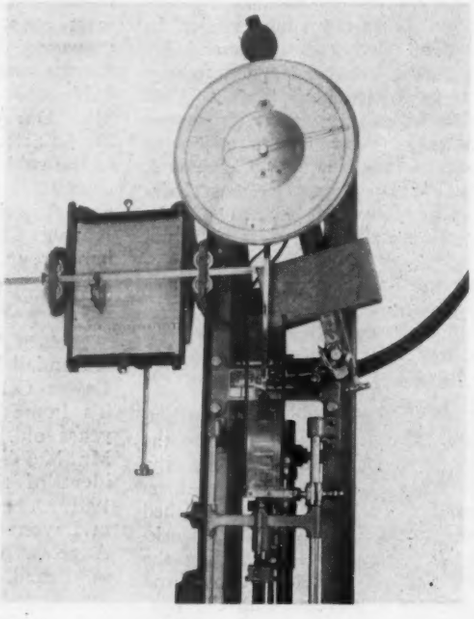
2545 EAST 79th STREET, CLEVELAND, OHIO

NEW EQUIPMENT

Scott Model ORR-L-5 Tester

An improved tensile tester for rubber and other high elongation materials has been introduced by Scott Testers, Inc., Providence, R. I. Called the Model ORR-L-5, it is a highly precise tensile tester including all of the features of the standard Model L-5 with special additions as developed through the cooperation of the Subcommittee on Test Methods of the Office of Rubber Reserve, the National Bureau of Standards and the company's own engineering department.

The head of the new tester is of the inclination balance type with one adjustable resistance weight compensation



for specimen thickness over a narrower range than the standard model, but a range sufficient for specimens prepared from standard laboratory slabs. This resistance weight is adjusted by means of a screw actuated by a handle located at the lower end of the pendulum lever.

A second vernier adjustment is incorporated into the pendulum to compensate for the width of the specimen as cut by a standard die. This range on the .250" is ± .005", thus eliminating this variable influence from the true tensile determinations.

Another original feature of the instrument is an electrical solenoid for disengaging the pawls from the quadrant during the test. This is actuated by the tension of the sample. The release of this tension at the rupture of the sample engages the pawls, retaining the maximum tensile value. The return of the pendulum to the 0 position is accomplished manually. The source of electrical current for this feature is incorporated into the electrical recording equipment; no additional supply is necessary.

The use of an entirely different stylus driving mechanism has been incorporated into the recording of the test values. The glass covered spark stylus is attached to a specially formed rigid carriage bar. This bar moves through four polished center guides that rotate on

MUEHLSTEIN · FIRST IN SCRAP RUBBER · MUEHLSTEIN · FIRST IN SCRAP RUBBER · MUEHLSTEIN · FIRST IN SCRAP RUBBER ·

DC MOLD RELEASE EMULSION NO. 35

FOR *CLEAN* RELEASE

PHOTO COURTESY WACO DIVISION, THE GENERAL TIRE AND RUBBER CO.

DC Mold Release Emulsion No. 35 helps to reduce the cost of producing heavy service as well as passenger tires.

By clean release we mean that tires with a high surface finish and sharp tread blocks are easily removed from molds that stay clean. And that means lower costs and higher quality in an increasingly competitive market. Like most of the leading rubber companies in all parts of the world, the Waco Division of The General Tire and Rubber Company uses DC Mold Release Emulsion No. 35 to assure easy release and good surface appearance in molding Farm Service Tires.

Molds stay clean 5 to 20 times as long because this silicone release agent does not decompose at molding temperatures to form a carbonaceous deposit on the mold. Mold maintenance is, therefore, reduced to a minimum. Scrap cost is lower because surface blemishes, non-knits, and fold-overs are virtually eliminated.

Tire manufacturers also save time and labor by using DC Mold Release Emulsion No. 35 to simplify the bagging and debagging operation. A dilute solution of Emulsion No. 35 is applied to butyl curing bags either by dipping or spraying. The curing bag is prelubricated and slips into the carcass more easily. Inside blemishes such as separated cords and loose tuck-unders are greatly reduced. Service life of bags is increased because they do not stick to the carcass removed after molding.

DC Mold Release Emulsion No. 35 is easy to use either as a mold or curing bag lubricant. Molds may be sprayed, brushed or wiped with a dilute solution containing about 50 to 150 parts of water to 1 part of Emulsion. Bags are lubricated with 1 part Emulsion in about 35 parts of water with additional slip agents included in some applications.

DOW CORNING CORPORATION, MIDLAND, MICHIGAN

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Los Angeles: 1514 S. Hope St. • New York: Empire State Building
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PHONE OUR NEAREST BRANCH OFFICE OR WRITE FOR OUR NEW 16-PAGE PAMPHLET NO. C 12-V DESCRIBING DOW CORNING SILICONE MOLD RELEASE AGENTS

Dow Corning
FIRST IN SILICONES

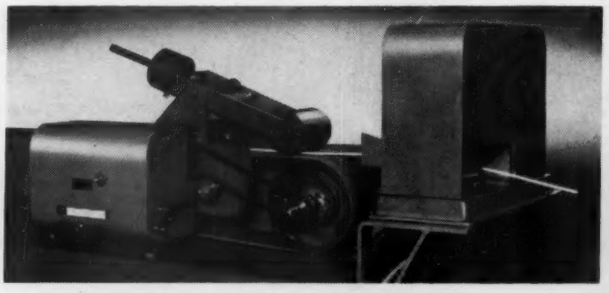
ground pivot points. The machine end of this carriage bar is a Scotch cross-head and this is connected to the pendulum by two precision ball bearings. The purpose of this design is two-fold: (1) to reduce to a minimum the influence of the recording equipment upon the test results; (2) to equally space the load recordings across the Tensilgram. This increases the accuracy of the moduli readings.

Tensilgrams for recording tensile per square inch with maximum of 1500% elongation of 1" length of sample can be supplied for all capacities. The size of the standard Tensilgram is 8½" x 11". Other Tensilgrams can be developed on special order.

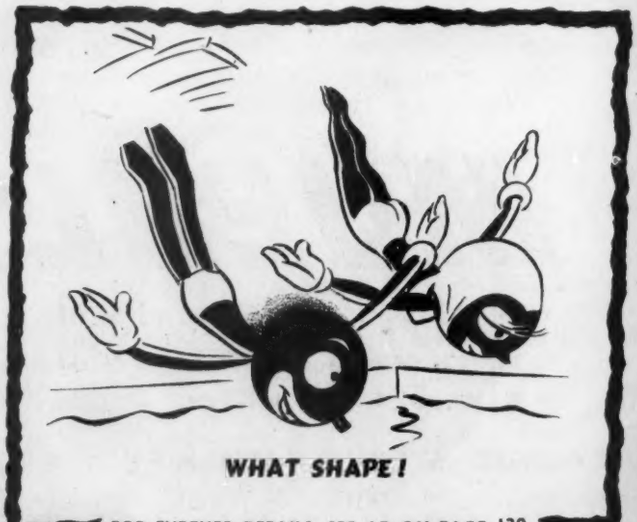
The Model ORR-L-5 is 92 inches high, 45 inches wide, has a 35-inch stroke, and weighs 392 pounds. The company has made conversion kits available so that existing machines can be changed over.

Cut-Off Attachment for Extruders

Barker & Davis Machine Co., Inc., Leominster, Mass., is currently marketing an automatic cut-off attachment for extruding machine conveyors. Easily attached to the conveyor, the machine automatically cuts extruded rods, tubes, sheets and shapes to any desired length. It is



available in cutting knife widths up to 8 inches, but models with wider blades for cutting up to 36 inches can be provided. The unit is electrically-powered and controlled. Over-all height of the cut-off unit is 15 inches, and that of the timer is 8 inches. The cut-off weighs 95 pounds and the timer 50 pounds. The timing device can be seen at the left of the accompanying illustration.



FOR FURTHER DETAILS, SEE AD ON PAGE 130

Precision Built
UNITED ROLLS
for the PROCESSING of
RUBBER
Plastics . . . Tile . . . Paint . . . Linoleum
and other Non-Metallic Materials

Corrugated Rubber Cracker Roll

Reg. T. M.

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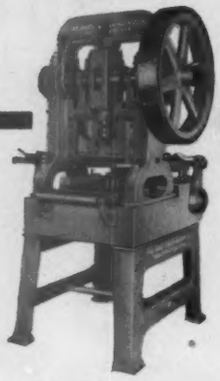
United rolls are in use in leading processing plants throughout the world. Their wide acceptance is the result of progressive research and more than 30 years experience in roll design and manufacture.

Consult us on your next requirement. Our engineers will be glad to assist you when specifying for conventional applications or for new or unusual processes.

Designers and Makers of Rolls and Rolling Mill Equipment

Rubber Cutting Machines with a Lifetime of Uniform Quality

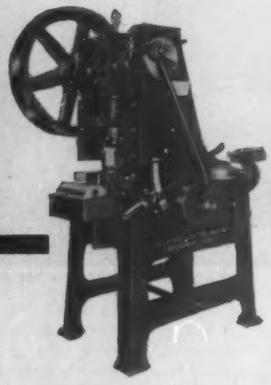
ENGINEERED TO MEET YOUR PARTICULAR REQUIREMENTS



MODEL A2

COULTER RUBBER CUTTING MACHINES have been used successfully for years and years in the cutting of continuous volumetric control and stripping for Heels, Soles, Taps and other molded products.

MODEL A1



- Model A1 for Heels at high speed production, or short runs.
- Model A2 for Multiple Heels, Half and Full Soles with stock grain.

MODEL A3

- Model A3 for Multiple Heels and Taps with or across stock grain.
- Model A2S (Not shown) for cutting crosswise of grain of stock.

PRODUCTION MACHINES SINCE 1896

The James COULTER Machine Co.

BRIDGEPORT • CONNECTICUT • U. S. A.

New Taber Abrasion Testing Set

A new abrasion testing set in the company's line of standard rub-wear abrasion testers, incorporating the unique rotary abrading action on a 4-inch specimen, has been added by the Taber Instrument Corp., North Tonawanda, N. Y. New features include improved suction pump with vertical dust receiver with swinging nozzle fully adjustable for any thickness specimen. Different materials require a varying degree of suction cleaning while being tested, therefore, the control unit is equipped with a build-in variable transformer for adjusting the speed of the suction turbine motor. The

control panel is also equipped with an adjustable timer to provide a test period of 1000 cycles, or less, and then automatically shutting off the power permitting the operating technician to be otherwise engaged in tabulating results or preparing new specimens without concern of overrunning the test being made.

Switches on the front of the control panel provide any combination of operating conditions, such as with or without vacuum pickup, continuous operation without timer or any timing up to 15 minutes. An important feature of the new testing set is that the control unit is equipped for dual operation, that is, an additional abraser unit can be located beside and connected with the control unit thereby permitting two specimens to be tested simultaneously using the same controls and vacuum unit.

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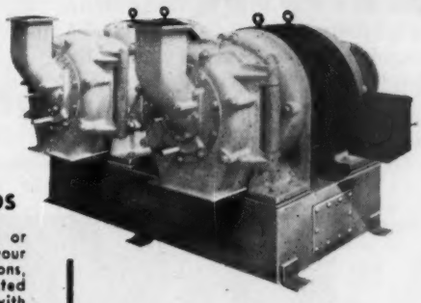

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To improve upon or further develop your processing operations, you should be posted and acquainted with the advanced features incorporated in "Unique" Equipment (Mixers, Mills, Cutters, Crushers, Sifters).

Rubber products manufacturers find Robinson reclaiming equipment helpful in conserving critical materials and in maintaining production. Investigate Robinson Crushers, Knife Cutters, Water-cooled Grinders and Attrition Mills. Efficient economical operations assured. Literature available. Write today.

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a sponge rubber blowing agent

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★ **NON-DISCOLORING**

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★ **PRODUCES SPONGE HAVING SMALL, UNIFORM CELL STRUCTURE**

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BETTER THINGS FOR BETTER LIVING ...THROUGH CHEMISTRY

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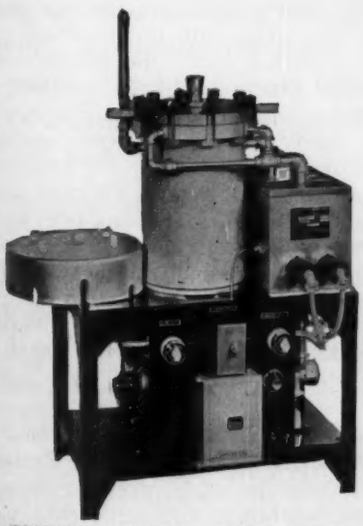
THE LABORATORY IS THE SOURCE OF EFFICIENCY IN MANUFACTURING . . . .

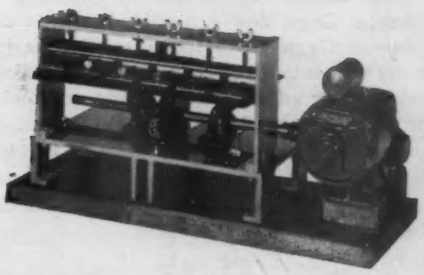


COMBINATION BIERER-DAVIS OXYGEN AGING AND AIR AGING APPARATUS.

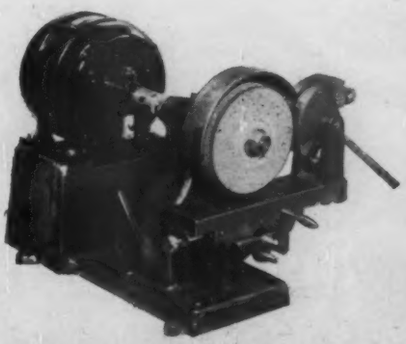
We manufacture various types of Rubber Laboratory Equipment

including

Bierer-Davis Oxygen Aging and Air Aging Apparatus, Aging Ovens and the Ross Flexing Machine.



ROSS RUBBER FLEXING MACHINE.



RUBBER SAMPLE BUFFING MACHINE. (SHOWN WITH ROTARY PLATEN)

EMERSON APPARATUS CO.

183 Tremont Street Melrose, Mass.

Above: The "business end" of the "Magnetic" Schuster Gage; prevents major losses of time and materials by keeping constant automatic control on thickness.

Left: The "Magnetic" Control Meter; automatically corrects the mill for any variation from required thickness, eliminates the human element.

How to control thickness continuously and accurately

Most mill men now agree that the only sure way to control the thickness of rubber, plastic, and other non-magnetic materials during processing is through CONTINUOUS GAGING. *Anything short of continuous gaging is makeshift, wasteful, expensive.*

Ideal device for continuous gaging is the "Magnetic" Schuster Gage, now a product of Pratt & Whitney. The Schuster Gage never lets the thickness pass beyond the limits without corrective action. Once installed, it is easily and quickly adjusted to the desired thickness, holds it as set right through to the end of the run. Rugged, simple; virtually no parts to wear out or be replaced.

Each installation is planned for the particular machine. Let us analyze your requirements; no obligation. Write for new descriptive literature.

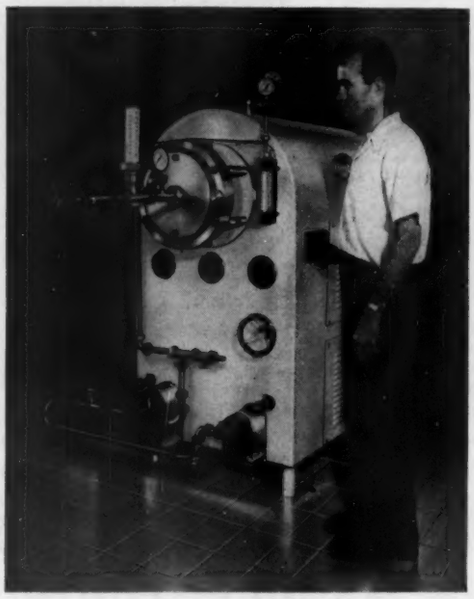
PRATT & WHITNEY
***Division* Niles-Bement-Pond Company**
West Hartford 1, Conn.

Pratt & Whitney "Magnetic" Schuster Gage
for positive, automatic thickness control

Oakes Continuous Automatic Mixer

To round out its line of AMF Glen Vertical Mixers, the American Machine & Foundry Co., 485 Fifth Ave., New York 17, N. Y., has acquired the manufacturing and leasing rights to the Oakes Continuous Automatic Mixer. Occupying but eight square feet of floor space, this mixer is said to mix, blend, emulsify and stabilize with equal satisfaction. It is already being used in regular production of latex foam sponge rubber, and lends itself to numerous applications.

The Oakes mixer is said to assure uniform, small cell structure which is so vital to good mixing and stability of finished products. Using a new mixing principle, the

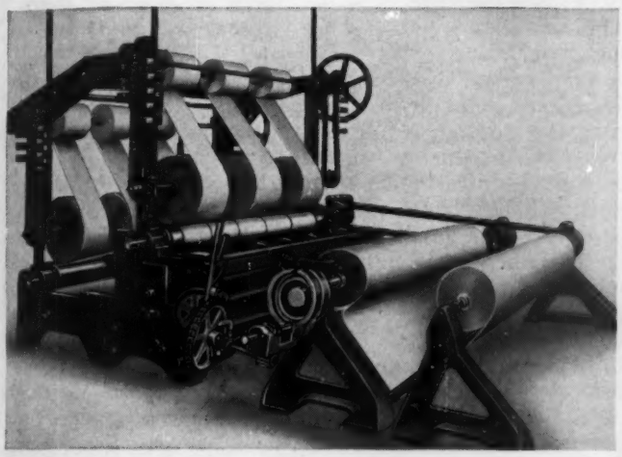


materials to be mixed are pumped into a specially designed mixing head where the variable speed rotor provides the correct amount of mixing while the desired air is incorporated under pressure. Since the mixer operates continuously on small quantities of the product, with the ingredients entering and leaving the mixing head in a matter of seconds, easily accessible controls enable the operator to change or maintain consistency quickly.

Some of the principal advantages claimed for the Oakes Continuous Automatic Mixer include the following: (1) Greater production capacity; (2) Reduced mixing costs; (3) Improved quality mixes; (4) Conservation of floor space; (5) More sanitary mixing; (6) Savings in horsepower required; (7) Possibilities of new product development.

F. J. Stokes Machine Co., Philadelphia, Penna., has introduced the **Model 294 Dual-Pressure Preformer.** By means of a floating die table, pressure is applied from both top and bottom at the same time to produce preforms of uniform density throughout. Because of this design, less power is required to apply high pressures and punch and die wear is reduced. Preforms are produced up to 4 inches diameter with a die fill of 2⅝ inches. Large die area permits making irregular and rectangular pieces up to 6 inches in length and 4 inches in width.

Another Camachine for production-minded IDEA MEN



The Camachine 8-A slits wide rolls of heavy material (such as belting) into strip of any width . . . rewinds the strip into firm, clean-cut rolls, positively separated on separate rewind shafts . . . and, at the same time, inserts a light liner material into each roll . . . all in one fast, dependable, economical operation! Also, the full-width liner material from the original full-size roll is rewound on a separate shaft, ready to be used again.

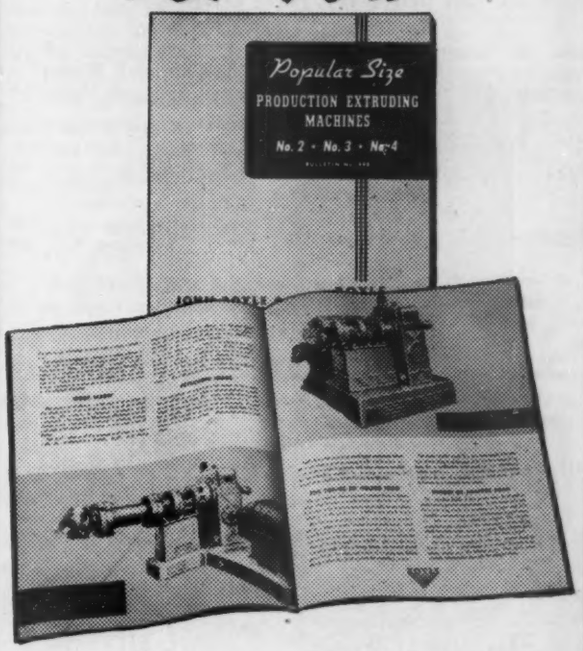
The versatile Camachine 8-A is typical of Camachine engineering for the rubber industry. Camachine specialists will gladly supply helpful, practical advice regarding the right type of slitting and roll-winding equipment to meet your needs. Write for literature.

CAMERON MACHINE COMPANY
61 Poplar Street, Brooklyn 2, N. Y.

Camachines
FOR FAST, TOP QUALITY ROLL PRODUCTION
. . . the world over

AA-181

ROYLE HAS PREPARED For You-



To meet the many requests for information concerning Royle "Popular Size" Extruding Machines, a fully illustrated, quick reference bulletin has been prepared describing the Royle # 2, # 3, and # 4 extruding machines — the extruders most commonly associated with current extrusion processes.

Please use the handy coupon below to order your copy of this useful bulletin. It will be sent to you promptly and without obligation.

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PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN PATERSON N. J. 1880

Please send me Royle bulletin titled "Popular Size."

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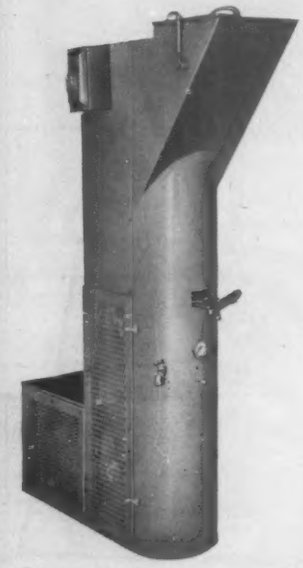
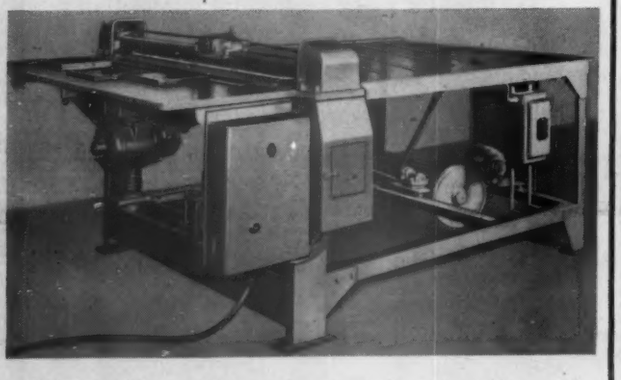
THESE MACHINES SAVE YOU MONEY!

They cut costs because they boost production. They improve efficiency and build your profits. And we can prove it! Here's why!



The Campbell Model 1404-2 Dusting Machine gives you a clean and more efficient dusting operation. It is absolutely dust-tight and moisture-proof. Ejects four ounces to 30 pounds per hour in continuous mist or cloud. Requires no connections to factory air lines and uses only 40 inches floor space. Write today for Bulletin No. 1.

Campbell Floor Tile Cutting And Blocking Machines



This machine quickly and accurately cuts rubber and plastic floor tiling into square or oblong blocks or feature strips. It cuts in one-inch gradations from 4 x 4 minimum to 24 x 24 maximum. It eliminates costly cutting dies and presses and reduces direct labor costs. Also accurately cuts crude rubber sheet stock into exact size needed for molded accessories. No guess-work, no waste, no scrap. Three sizes, Model 42-54-72. Proved by use. Ask for Bulletin No. 2 today.

The FALLS ENGINEERING AND MACHINE CO.

1734 FRONT ST. CUYAHOGA FALLS, OHIO

Established 1917

Report on Properties of Dry Rubber

(Continued from Page 188)

results of mechanical tests is higher for purified rubber than for commercial smoked sheet.

A marked improvement in the vulcanization of the rubber-sulfur mix was obtained in the presence of pyrogallol but this may have been due to the effect of pyrogallol on the course of the reaction between rubber and sulfur. The only conclusive experiment is the rather difficult one of vulcanizing the rubber in the complete absence of air. This may be tried in 1948.

The study of highly purified rubber is still proceeding, and even if there is no possibility of preparing such material commercially the experiments indicate the lines along which an improved method of preparation should be sought. They also indicate that within the limits of the basic molecular structure, there are reasonable possibilities of obtaining rubber hydrocarbon of improved industrial value.

One method of achieving this would be to study the variation in the hydrocarbons synthesized by a wide range of seedling trees and using the best as mother trees for producing vegetative offspring. Plans have been made to carry out such an investigation in Malaya during 1948. The development of new clones solely on account of the quality of the hydrocarbon is of course an extremely long range undertaking and unless the improvement in quality were of outstanding practical importance it would need to be brought into association with the characteristic of high yield of latex by the tree to be of economic interest to growers of plantation rubber.

In the meantime a study is in progress at the Imperial Institute of the rubber hydrocarbons from each of a number of well-known Malayan clones likely to be recommended for planting on a large scale owing to their high-yielding and other favorable characteristics.

A completely new, rugged, small-size, low cost **electric tachometer,** designed for continuous operation, has been announced by the Electric Tachometer Corp., Philadelphia 3, Penna. Due to design innovations, the new tachometer (Model M-1200) is said to provide exceptional performance over a wide range of speeds and to be substantially free from the effects of stray magnetic fields. It measures only 2¾ x 5⅜ inches.

FOR FURTHER DETAILS, SEE AD ON PAGE 130

SIMPLEX
REG. TRADE MARK

RUBBER STRIP CUTTER

PATENTED

A PORTABLE machine capable of stripping slab rubber up to 1″ thick at the rate of 20,000 feet in 8 hours. Any width desired.

SPECIAL FEATURES

- Has micro-adjustment for accurate widths.
- Equipped with water tank which feeds water to the slotted knife and to the cut.
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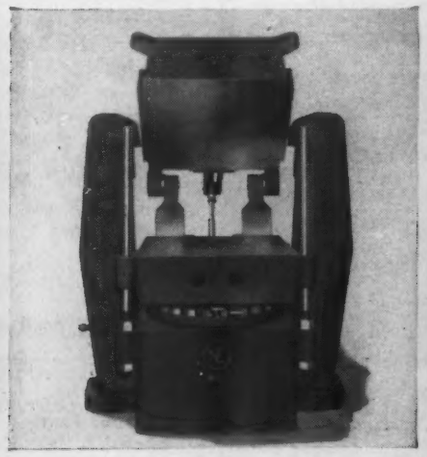

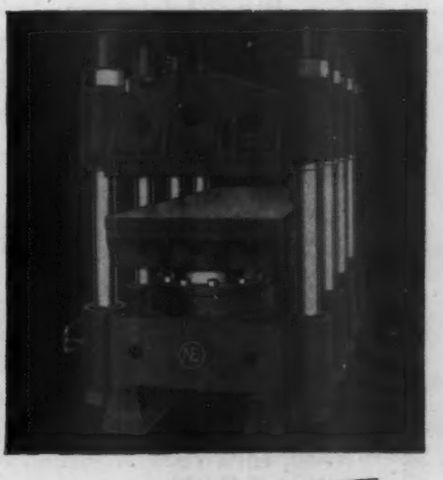

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REVIEWS

BOOKS

Le Caoutchouc: Materiau de Construction. (Rubber: Material of Construction). Published by Dunod, 92 Rue Bonaparte, Paris (6e), France. 5 x 8 in. 234 pp. 560 fr. (approximately $2.50. (In French.)

Prepared by the Institut Francais du Caoutchouc (French Rubber Institute), particularly with the help of Messrs. George Colin, Andre Jarrijon and Pierre Thirion, and issued as part of Dunod's series of practical techniques, this book treats with the use of rubber as an engineering material, particularly methods of bonding rubber to metal. It fills a distinct gap in the French rubber literature and is designed to acquaint engineers in the automotive, aeronautical, naval, marine and other industries with rubber's potentialities. The book is divided into five sections, as follows: (1) The Source of Rubber; (2) The Rubber Industry; (3) Physical Properties of Rubber; (4) Use of Rubber as a Bonding Material; (5) Mechanical Applications of Rubber. Author and subject indexes are included, as well as a bibliography of original source material.

•

Technical Data on Plastics: 1948. Compiled and published by the Plastic Materials Manufacturers Association, Inc., 14th and K Streets, N. W., Washington 5, D. C. 8½ x 11 in. 140 pp. $2.50.

This latest edition of "Technical data on Plastics," the third to be compiled and issued by the association, covers 23 types of plastic materials, a foreword on each material being followed by tables of property data on fabrication, miscellaneous tests, durability, electrical tests, and mechanical tests. The data in the tables were derived from tests made by each manufacturer on his own products. The figures were then studied and a range of values selected which would cover all the values submitted for a particular grade of material. A.S.T.M. methods were used wherever applicable. Among the plastic materials covered are vinyl chloride polymers and copolymers.

BOOKLETS, CATALOGS, etc.

Neoprene Type AC. By L. S. Bake. (Report No. 48-3). DuPont Rubber Chemicals Division, Wilmington 98, Deleware. 6¼ x 9¼ in. 24 pp.

Data on Neoprene Type AC, a quick-setting neoprene polymer developed for use in adhesive compositions, is contained in this technical report. Characteristics of the polymer are given, as is the effect of milling. The functions of compounding ingredients in Neoprene Type AC cements are outlined and compounding suggestions made. One section of the report is devoted to the vulcanization of dried films from these cements. For completeness, an index is included.

•

New Method of Heating and Cooling of Calenders and Platen Presses. American Hydrotherm Corp., 215 East 27th St., New York 16, N. Y. 8½ x 11 in. 4 pp.

The specific advantages of Hydrotherm heating, which utilizes a high-temperature fluid system, are emphasized in this four-page folder. Application of the system to the heating and cooling of calenders and platen presses is outlined both in text and in schematic drawings. Increased production and quality are claims made for the system in these instances.

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REVIEWS (CONT'D)

Swelling of Neoprene in Chemicals, Oils and Solvents. (Report No. BL-223). DuPont Rubber Chemicals Division. Wilmington 98, Delaware. 6¼ x 9¼ in. 16 pp.

This report contains data showing the volume change of various neoprene compounds after immersion in 185 different chemicals, oils and solvents. The data is presented by chemical types, with specific materials listed alphabetically within these types. The classification includes hydrocarbons, organic acids, hydroxy compounds, aldehydes, ketones, ethers, amines, nitriles, inorganic compounds, etc. Although many of the compounds and immersion conditions do not bear direct relationship to one another, a comparative method of using the data will be useful for predicting the serviceability of neoprene compounds in various applications.

•

Engineering for the Rubber and Plastic Industry. Industrial Engineering Division, Giffels & Vallet, Inc., 1000 Marquette Bldg., Detroit 26, Mich. 8½ x 11 in. 12 pp.

The extensive engineering services offered to the rubber and plastic industries by the company, including the designing of special equipment for automatic compounding, continuous tube lines, milling, carbon black, handling, continuous mixing, etc., are outlined in this attractive two-color booklet. A list of representative projects which the company has completed for prominent firms in the field is included. Flow charts of some of these projects are reproduced in the booklet.

•

Witco No. 30: A New Softener. (Technical Service Report No. R-6). Witco Chemical Co., 295 Madison Ave., New York 17, N. Y. 8½ x 11 in. 8 pp.

Properties, characteristics and advantages of Witco No. 30, a new petroleum base softener, are covered in this technical bulletin. The physical properties imparted to rubber and GR-S by the material are discussed and comparisons made with other types of softeners. Comparative tensile, modulus and plasticity results of typical compounds are shown in both table and graph form.

•

Design Increases Sales. Barnes & Reinecke, Inc., 230 E. Ohio St., Chicago, Ill. 9 x 12 in. 4 pp.

The revolution in the design of both consumer and industrial products which has taken place in recent years is exemplified in this unusually attractive, four-page, four-color, french-fold brochure. A number of the smaller products designed by the company are reproduced in full color. These products range from plastic toy automobiles to radios. Some of the company's larger projects are also indicated.

FOR FURTHER DETAILS, SEE AD ON PAGE 130

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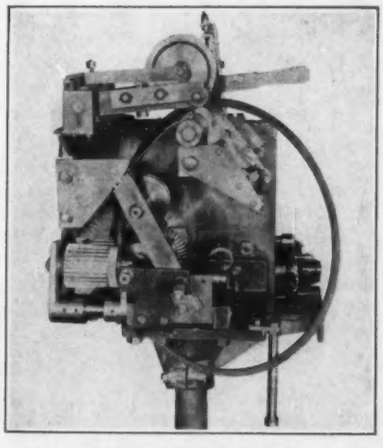

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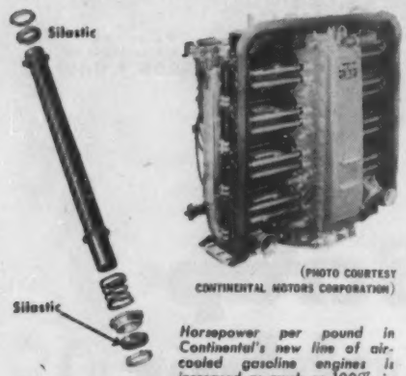

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†See Silicone News, Dec. 1947, for story on 50% reduction in size and weight of electric motors made possible by Dow Corning Silicone Insulation.

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REVIEWS (CONT'D)

Production Costs and Breakeven Points. (Production Series No. 177). American Management Association, 330 West 42nd St., New York 18, N. Y. 6 x 9 in. 48 pp. $1.00.

Another in the series of pamphlets presented by the American Management Association reproducing papers which were presented at recent meetings of the Association. This pamphlet offers three papers on: "The New Meaning of Breakeven Points"; "Developing Standard Costs on Non-Productive Expense"; and "The Wage and Price Outlook." As is the custom in the production series, the questions asked at the presentation of the papers and the authors replies are published. Charts and tables serve to illustrate the points raised in the papers.

•

How to Get Extra Service Out of Automobile Tires. Rubber Manufacturers Association, 444 Madison Ave., New York 22, N. Y. 8½ x 11 in. 32 pp.

This booklet consolidates and modernizes all of the information respecting the proper care of automobile tires previously issued by the Association in the form of individual service bulletins, each of which dealt with a particular phase of tire abuse or misuse. The new booklet is divided into six sections dealing with various automobile tire wear conditions such as fabric breaks, tread wear, inflation, wheel balance, cuts and repairs, and tubes and tire mounting and demounting. Charts, diagrams and photographs are included.

•

Marvinol VR-10—Vinyl Resin. Chemicals Division, Glenn L. Martin Co., Baltimore 3, Md. 8½ x 11 in. 8 pp.

Properties and uses of and processing methods for Marvinol VR-10, the general purpose grade of vinyl resin made by the company, are covered in this technical bulletin. Under compounding, premixing, fluxing and granulation are discussed. Under processing, subjects covered include calendering, extrusion, coating and film casting, and injection molding. A final section is devoted to the proper plasticizers, stabilizers and pigments and lubricants which should be used with the resin. A list of typical uses of Marvinol resins, classified by groups, is also included.

•

Barrett Rubber Softeners in Nitrile Rubber Compounding. (Rubber Laboratory Release No. 9). Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 8½ x 11 in. 36 pp.

As indicated by its title, this latest Barrett technical release discusses the use of various softeners featured by the company for use in the compounding of the various nitrile rubbers. The performance of four softeners are discussed, these being Bardol, BRV, Dispersing Oil 10 and dibutyl phthalate. Nitrile rubbers used in typical formulations included Butaprene NXM, Chemigum N-3, Hycar OR-15, and Perbunan 18. Typical formulas are shown, with physical test results given in each instance.

•

Double Runner Attrition Mills. (Bulletins No. DR-448, DRC-1 and DRF-1). Sprout Waldron & Co., Muncy, Penna. 8½ x 11 in. each.

These three bulletins, consisting of a major 8-page bulletin and two supplementary 4-page bulletins, are devoted to the company's double runner attrition mill. The major bulletin (DR-448) describes how the mill is used in modern industry. Construction details are adequately illustrated and discussed along with required products collecting systems. Of the supplementary bulletins, one (DRC-1) considers the mill in general processing applications other than feed grinding, while the other (DRF-1) applies strictly to the feed industry.

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REVIEWS (CONT'D)

Vulcanization of Neoprene With Red Lead. (BL-227). Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 6 x 9 in. 4 pp.

The use of red lead as a curing agent for neoprene compounds is discussed in this bulletin in a comparison between the lead and litharge as vulcanizing agents. Tests were conducted in accordance with ASTM requirements, and a summary of physical test data as to stress, tensile, elongation, durometer hardness, etc., is provided. Mooney scorch characteristics of neoprene compounds containing red lead and litharge are presented in graph form, as is the storage stability of neoprene compounds containing both materials.

•

Cumar. Barrett Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 8½ x 11 in. 64 pp.

Much new information descriptive of new uses for Cumar resins in new fields, developed during and since World War II, is contained in this publication. Comprehensive product data and properties, testing methods, useful charts and a color page showing Cumar resin color standards are included. A section of the booklet is devoted to uses, with separate chapters relating to the application of the resin in various industries, such as rubber, plastics, paint and varnish, coatings, floor and wall tile, molded products, printing ink, paper products, adhesives, and insulation.

•

Organizing for Efficient Production. (Production Series No. 176). American Management Association, 330 West 42nd St., New York 18, N. Y. 6 x 9 in. 36 pp. 75 cents.

Papers included in this booklet were originally presented at the Winter Production Conference of the AMA on December 15-16, 1947, in New York City. Subjects covered include principles of decentralized operation, cutting indirect costs through better materials handling, economies through new buildings and plant layouts, and efficient purchasing for production. Questions which were asked at the original session are included, as are the answers given by the authors at that time.

•

H-P-M Smooth Line Laboratory Press. (Bulletin No. 4801). The Hydraulic Press Mfg. Co., Mount Gilead, Ohio. 8 x 10½ in. 6 pp.

This bulletin describes in detail the company's new 20 ton capacity, self-contained laboratory press. The manner in which the press works is outlined, and different diagrams illustrate the use of various fixtures and attachments furnished by the company as optional equipment. A quick reference chart for fixture units is provided which indicates which items are interchangeable.

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NEW YORK, NOVEMBER 8, 1948

Natural Rubber

The price of spot rubber on the Commodity Exchange has swung in a range of 1.87 cents since our last report (October 7), high for the period being 22.62 cents reached on October 14 and again on October 15, and low 20.75 cents reached on November 5. The average price of spot rubber for the month of October was 22.13 cents based on 20 trading days. This compares with an average of 22.81 cents for September.

Instead of 30 cents bulls before the end of the year, which trade circles had expected a few weeks ago, there is now developing a unanimous view of lower prices for crude rubber. The reversal in sentiment can be attributed to the availability of Government stockpile rubber which is being rotated, increased production, and enlarged Dutch East Indies shipments.

Rubber exports from Indonesia during September are estimated at 51,621 long tons, a new post-war high, the Rubber Division, Office of Domestic Commerce, Department of Commerce, said recently. The record figure, reported by the Secretariat of the Rubber Study Group, shows a substantial advance over the 40,937 tons shipped from Indonesia in August. Total Indonesian shipments for the first nine months of the year are estimated at 328,125 long tons. Continuance at the average rate for August and September would bring the 1948 total to 466,962 tons.

Government-owned rotation rubber has been taken rather freely in recent weeks. Quantities to be sold in the near future have not been disclosed, but trade circles estimate that the amount will be considerable.

Today's quotations in the outside market, London and Singapore, follow:

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.20⅞
December	.20¾
January-March	.20⅝
Thin Latex Crepe:	
Spot	.23
November-December	.22⅞
Thin Brown Crepe, No. 2	.15¼
Ambers, No. 3	.15¼
Flat Bark Crepe	.11⅛

London Market

(Standard Smoked Sheets)

January-March	20.31 - 20.41
April-June	20.05 - 20.15

Singapore Market

(Standard Smoked Sheets)

November	18.37 - 18.50

Synthetic Rubber

(Dry Types-Per Pound)

Butaprene NF	.390 - .415
Butaprene NL	.400 - .425
Butaprene NAA	.440 - .465
Butaprene NXM	.470 - .495
Chemigum 30 N4NS	.400 - .470
Chemigum 50 N4NS	.400 - .470
Chemigum N3	.450 - .520
Hycar OR-25	.400 - .425
Hycar OR-15	.470 - .495
Hycar OS-10	.400 - .425
Neoprene Type E	—— - .650
Neoprene Types CG and AC	—— - .500
Neoprene Types FR and KNR	—— - .750
Neoprene Type S	—— - .320
Neoprene Type NC	—— - .250
Perbunan 18	.430 - .450
Perbunan 26	.440 - .460
Perbunan 35	.510 - .530
Silastic (compounded)	.235 - .440
Thiokol Type A	.370 - .470
Thiokol Type ST	.750 - .850
Thiokol Type FA	.520 - .620
Thiokol PR-1	.750 - .850

Scrap Rubber

The export of scrap rubber still faces difficulties because of the European dollar shortage and the problems encountered in import licensing. The market has been continuing at fairly low levels, and while trade circles had previously expected some gains during this period, such gains have not been forthcoming. Prices remain substantially the same. Current quotations follow:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$12.00
Beadless truck tires	ton	nom.
Mixed truck tires	ton.	12.00
Beadless passenger tires	ton	nom.
No. 1 passenger peelings	ton	42.50
No. 1 truck peelings	ton	42.50
Red passenger tubes	lb.	.06¼
Black passenger tubes	lb.	.03½
Mixed passenger tubes	lb.	.03¾
No. 2 truck tubes	lb.	nom.
Red truck tubes	lb.	.06
Black truck tubes	lb.	.03
Buffings	ton	15.00

Reclaimed Rubber

Preliminary estimate for consumption of reclaim during September was set at 24,115 tons compared with the 22,917 tons consumed in August. Consumption of reclaim for the first nine months of 1948 totaled 207,027 tons. The market has assumed a firmer tone with production and demand running about equal. Some changes have been evidenced in the price structure. Current quotations follow:

Tires

Black, Acid	lb.	.08¾ - .09¼
Black, Digester	lb.	.08½ - .09
Peels	lb.	.09 - .09½
GR-S Whole Tire	lb.	.08½ - .09

Inner Tubes

Black	lb.	.12¾ - .13¼
Red	lb.	.13½ - .14½
GR-S	lb.	.10¼ - .10¾
Butyl	lb.	.08½ - .09

Shoe

Unwashed	lb.	.08¼ - .08¾

Cotton Tire Fabrics

The general trend for cotton tire fabrics continues at low levels. Trade circles were formerly of the opinion that the discrepancies which existed between the buyer's and the seller's market would stabilize to some extent during the current period. This has not been the case, however. The price structure for cotton tire fabrics has been adjusted to conform with generally unfavorable conditions. Current quotations follow:

Standard, Peeler, 12/4/2	lb.	.74
Standard, Peeler, 14/4/2	lb.	.76
Standard, Peeler, 16/4/3	lb.	.7850
Extra Staple, Peeler, 12/4/2	lb.	.8315
Extra Staple, Peeler, 14/4/2	lb.	.8575
Extra Staple, Peeler, 16/4/3	lb.	.8825

Chafers

14.4 oz. (per sq. yard)	lb.	.7400
9.25 oz. (per sq. yard)	lb.	.6975
11.65 oz. (per sq. yard)	lb.	.6700
8.9 oz. (per sq. yard)	lb.	.7125

Cotton

The price of middling uplands on the Cotton Exchange has swung in a range of 68 points since our last report (October 7), high for the period being 32.27 cents on October 20, and low 31.59 cents on November 1. The average price of middling uplands for the month of October was 32.01 cents based upon 25 trading days. This compares with an average of 31.92 cents in September.

World cotton production in 1948-49 is forecast at 29,750,000 500-pound bales by the Office of Foreign Agricultural Relations. This is 4,350,000 bales or 17% above last year's estimate and approximately equal to production in the late 1930's, with the exception of the unusually large crop of 39,000,000 bales in 1937-38.

Authorizations for raw cotton procurement under ECA during the next few weeks may be larger than any previous month's cotton business, trade circles report. During August, ECA paid out about $55,000,000 for raw cotton shipped from the United States to Marshall Plan countries and to China. The American cotton crop is now moving to market in heavy volume, and ECA operations were expected to increase accordingly.

An initial shipment of 14,000 bales of American cotton purchased under terms of the $60,000,000 revolving fund agreement arrived in Japan in early October, according to Japanese occupational authorities. The balance of the first purchase which totaled about 56,000 bales was scheduled for arrival in Japanese ports shortly. It was estimated that about one-third of the revolving fund or about $20,000,000 was used to finance these first few shipments.

Quotations for middling uplands on the Exchange follow:

	Oct. 7	November 8		
	Close	High	Low	Close
December	31.21	31.44	31.30	31.43
March	31.06	31.49	31.34	31.48
May	30.78	31.35	31.18	31.45

Closing Rubber Prices on New York Commodity Exchange

FROM OCTOBER 8 TO NOVEMBER 8

Date Oct.	Spot	Mar.	May	July	Sept.	Sales
8	22.50	21.30	21.10	21.00	20.90	33
9	——	——	——	——	——	——
10	——	——	——	——	——	——
11	22.38	22.08	21.88	21.65	21.45	33
12	——	——	——	——	——	——
13	22.50	22.15	22.05	21.90	21.70	5
14	22.62	22.34	22.20	22.05	21.85	19
15	22.62	22.30	22.20	22.05	21.85	0
16	——	——	——	——	——	——
17	——	——	——	——	——	——
18	22.50	22.20	22.10	21.95	21.75	0
19	22.38	22.10	21.95	21.75	21.55	7
20	22.38	21.95	21.85	21.65	21.45	8
21	22.25	21.95	21.85	21.65	21.45	64
22	22.00	21.80	21.70	21.50	21.30	22
23	——	——	——	——	——	——
24	——	——	——	——	——	——
25	21.88	21.60	21.50	21.30	21.10	22
26	21.62	21.15	21.10	20.90	20.70	6
27	21.38	21.05	21.05	20.85	20.65	13
28	21.38	21.15	21.15	20.95	20.75	15
29	21.25	21.15	21.00	20.80	20.60	54
30	——	——	——	——	——	——
31	——	——	——	——	——	——
Nov.						
1	21.00	20.55	20.50	20.30	20.10	95
2	——	——	——	——	——	——
3	21.50	20.15	20.15	20.10	20.00	87
4	21.25	20.75	20.75	20.65	20.55	49
5	20.75	20.40	20.40	20.30	20.20	58
6	——	——	——	——	——	——
7	——	——	——	——	——	——
8	20.88	20.50	20.45	20.30	20.20	0

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STATISTICS *Of Interest to the Rubber Industry*

U. S. Imports and Re-Exports of Natural Rubber

	GROSS IMPORTS												
	Natural Rubber (Dry)			Natural Rubber (Latex)			Guayule				RE-EXPORTS		TOTAL NET IMPORTS
Year	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Total Gross Imports Long Tons	Long Tons	Total Declared Value	Long Tons
1936	467,064	152,072,496	14.54	19,852	6,659,899	14.98	1,229	286,552	10.41	488,145	12,581	4,488,223	475,564
1937	574,600	237,307,041	18.44	23,185	10,213,670	19.67	2,694	745,873	12.36	600,479	7,902	3,385,433	592,577
1938	397,620	125,357,730	14.07	11,878	4,147,318	15.59	2,485	623,819	11.21	411,983	5,652	1,799,124	406,331
1939	469,803	167,558,245	15.92	27,438	10,467,552	17.03	2,232	463,345	9.27	499,473	13,125	5,832,618	486,348
1940	780,820	303,117,726	17.33	33,789	14,593,466	19.28	3,634	758,007	9.31	818,243	7,060	3,197,136	811,183
1941	989,329	401,890,393	18.14	34,798	15,965,627	20.48	4,881	1,145,767	10.48	1,029,008	5,376	2,757,872	1,023,632
1942	265,980	112,377,896	18.86	10,646	5,630,667	23.61	5,523	1,660,792	13.42	282,149	10,856	5,913,386	271,293
1943	50,348	31,364,033	27.81	1,890	1,312,202	30.99	7,679	3,636,789	21.14	59,917	22,587	16,446,707	37,330
1944	103,820	73,908,389	31.78	3,091	2,092,211	30.22	6,700	3,351,233	22.33	113,611	9,739	8,712,695	103,872
1945	134,454	95,850,441	31.82	4,773	3,115,853	29.14	10,040	5,963,797	26.52	149,267	9,509	7,201,746	139,758
1947	690,954	306,919,456	19.83	17,722	9,820,080	24.91	2,880	1,492,825	20.30	711,556	4,122	2,354,494	707,434
1946:													
Dec.	44,159	23,810,760	23.87	2,005	1,501,336	33.43	494	265,679	24.02	46,658	17	20,625	46,641
1947:													
Jan.	92,459	51,035,472	24.64	.....	.....	....	315	169,081	23.65	.....	20	16,644	.....
Feb.	57,771	30,580,942	23.63	2,426	1,550,499	28.52	481	256,760	23.84	60,678	1,991	1,149,953	58,687
Mar.	35,128	19,421,550	24.46	496	324,103	29.15	463	246,573	23.76	36,087	39	23,592	36,048
Apr.	45,453	23,627,600	23.21	34	26,754	34.84	524	282,941	24.09	46,011	26	20,725	45,985
May	91,918	47,208,658	22.93	763	442,050	25.87	345	186,201	24.11	93,026	14	9,169	93,012
June	62,346	28,339,739	20.29	2,825	1,642,417	25.95	554	298,705	24.07	65,725	47	22,998	65,678
July	56,080	22,379,698	17.08	1,407	855,454	25.09	74	27,458	16.55	57,561	421	226,777	57,140
Aug.	43,637	16,127,766	16.93	1,784	960,877	24.48	104	24,768	18.54	45,525	191	118,666	45,334
Sept.	45,724	14,589,611	14.24	516	324,206	27.12	44	10,414	15.29	46,284	174	95,640	46,110
Oct.	46,898	14,819,306	13.11	3,081	1,370,242	19.85	....	.....	....	49,979	134	64,620	49,665
Nov.	48,952	16,962,935	15.46	1,994	1,042,644	23.13	....	.....	....	50,946	514	289,752	50,432
Dec.	69,158	24,458,323	15.21	2,438	1,280,834	23.45	....	.....	....	71,596	371	215,958	71,225
1948:													
Jan.	76,723	29,782,199	17.33	4,130	2,044,850	22.11	....	.....	....	117,906	334	206,103	117,572
Feb.	51,528	21,027,604	18.06	2,400	1,420,676	26.43	43	10,235	10.53	53,971	290	170,339	53,681
Mar.	68,848	27,902,550	18.09	3,148	1,730,014	24.02	25	6,845	10.05	72,021	467	215,156	71,554
Apr.	38,433	15,136,536	17.35	2,284	1,260,932	24.65	30	7,076	10.53	40,747	343	190,815	40,404
May	37,227	14,409,747	17.28	3,442	1,915,744	24.84	40	9,435	10.53	40,709	1,031	485,941	39,678
June	62,376	25,338,739	18.13	2,288	1,335,173	26.05	60	14,152	10.53	64,724	718	348,043	64,006
July	60,070	25,206,980	18.07	3,654	2,002,902	24.48	100	23,587	10.53	63,734	466	243,774	63,268
Aug.	65,736	26,975,557	18.33	2,395	1,389,495	25.81	....	.....	....	67,771	520	268,912	67,251

Source: U. S. Department of Commerce.
Notes: (1) Figures for latex are on a dry weight basis. (2) Figures for re-exports include natural rubber (dry and latex) and guayule.

Natural Rubber
(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1936	488,145	575,000	12,581	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1946:				
Dec.	57,620	38,802	23	237,467
1947:				
Jan.	102,080	45,328	43	294,191
Feb.	30,318	40,983	1,253	283,479
Mar.	40,437	43,104	509	280,812
Apr.	55,976	43,818	0	292,970
May	12,738	43,018	0	330,960
June	57,055	42,329	311	345,175
July	57,243	40,389	421	131,624
Aug.	44,672	47,289	191	130,040
Sept.	46,241	50,557	174	122,097
Oct.	49,340	57,286	314	114,115
Nov.	50,840	52,076	514	110,752
Dec.	71,414	56,284	371	129,038
1948:				
Jan.	80,564	58,174	334	136,227
Feb.	54,418	51,012	290	148,081
Mar.	72,070	54,444	467	130,295
Apr.	40,947	50,616	343	123,248
May	40,709	52,022	1,031	112,724
June	64,725	55,701	718	119,818
July	63,775	48,769	466	128,446
Aug.	68,131	53,366	520	129,622
Sept.	48,745	51,898	514	123,108

Source: 1936-40, U. S. Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

U.S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

	Balata		Jelutong		Gutta-Percha & Other Guttas	
Year	Tons	Value	Tons	Value	Tons	Value
1936	535	199,368	6,163	1,296,364	1,568	555,643
1937	354	151,344	7,109	2,017,786	1,122	440,894
1938	509	181,140	9,132	2,944,504	444	204,582
1939	694	265,553	6,640	1,603,418	1,740	539,255
1940	648	300,500	7,451	2,449,137	2,340	1,004,885
1941	924	489,514	8,821	2,954,001	1,783	607,025
1942	1,544	1,107,059	1,200	530,296	804	525,763
1943	1,047	708,701	35	14,840	....	.....
1944	1,012	660,805	88	45,578	10	4,999
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1946:						
Nov.	152	270,379	28	39,502	3	10,233
Dec.	199	287,167	57	41,757	26	52,096
1947:						
Jan.	183	252,580	37	29,087	36	71,252
Feb.	270	300,828	36	44,629	17	39,679
Mar.	137	158,530	190	112,132	21	28,898
Apr.	85	106,783	178	86,923	31	48,178
May	212	208,440	524	259,745	86	164,611
June	76	63,612	83	37,314	47	88,420
July	19	24,444	287	122,677	22	50,204
Aug.	151	159,338	143	78,357	19	46,667
Sept.	86	120,633	408	192,352	18	120,633
Oct.	210	389,245	352	187,255	35	88,776
Nov.	290	302,164	148	106,443	15	53,202
Dec.	172	189,934	412	240,023	42	77,371
1948:						
Jan.	56	35,973	481	289,506	69	94,854
Feb.	145	90,023	307	209,015	66	84,839
Mar.	283	189,933	436	271,314	51	101,691
Apr.	82	36,570	651	393,280	52	68,366
May	45	36,109	512	314,432	24	54,191
June	67	36,885	277	211,373	45	41,277
July	120	87,327	205	170,949	15	35,001
Aug.	59	50,511	112	107,431	53	39,607

Source: U. S. Department of Commerce.

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Synthetic Rubber—Totals

(GR-S, Neoprene, Butyl, and Buna N Types)

(All Quantities in Long Tons)

Year	Production	Imports	Consumption	Exports	Stocks On Hand at End of Period
1941	8,383	.....	6,259	572	1,702
1942	22,434	.....	17,651	1,419	4,612
1943	231,722	.....	170,891	18,148	41,568
1944	762,630	11,043	566,670	104,266	142,927
1945	820,373	10,407	693,580	83,778	203,454
1946	740,026	7,709	761,699*	72,920	114,963
1947	508,702	1,093	559,566	11,385	62,366
1947:					
Aug.	32,901	0	39,001	585	91,288
Sept.	30,518	0	41,865	343	79,246
Oct.	33,834	0	45,668	194	67,379
Nov.	37,825	634	39,091	188	67,871
Dec.	38,134	455	43,230	358	62,366
1948:					
Jan.	39,428	1,121	43,003	416	60,290
Feb.	39,025	1,318	35,375	428	65,649
Mar.	43,940	1,769	38,222	383	72,885
Apr.	40,846	.....	34,632	563	78,722
May	42,866	.....	35,268	367	85,734
June	41,207	.....	39,204	264	89,088
July	41,267	9	34,511	257	96,140
Aug.	39,630	3,599	39,339	276	97,197
Sept.	37,890	2,403	39,211	628	98,312

Source: Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures shown include the output of both government and privately-owned plants. (3) Figures for 1941 are estimated. * Includes year-end adjustment of 5,384 tons to cover non-reporting companies.

Synthetic Rubber—By Type

(All Quantities in Long Tons)

New Supply

	GR-S (Buna S)	GR-M (Neoprene)	GR-I (Butyl)	Buna N Types	Total
1942	3,721	8,956	23	9,734	22,434
1943	182,259	33,603	1,373	14,487	231,722
1944	679,949	56,660	20,252	16,812	773,673
1945	724,859	45,672	52,378	7,871	830,780
1946	613,408	47,766	80,823	5,738	747,735
1947	408,858	31,495	62,824	6,618	509,795

Consumption

1942	2,579	6,833	22	8,217	17,651
1943	131,977	26,205	304	12,405	170,891
1944	495,552	46,243	10,763	14,112	566,670
1945	600,145	42,394	43,012	8,029	693,580
1946	632,126	44,357	79,228	5,988	761,699
1947	448,589	37,703	68,838	4,536	559,666

Exports

1942	222	1,037	....	160	1,419
1943	14,937	2,540	40	631	18,148
1944	98,380	4,799	530	557	104,266
1945	76,555	5,837	980	406	83,778
1946	68,763	2,642	495	1,020	72,920
1947	7,951	2,617	62	755	11,385

Stocks at End of Period

1942	1,050	1,786	4	1,772	4,612
1943	30,975	6,415	1,035	3,143	41,568
1944	116,130	11,739	9,892	5,166	142,927
1945	170,571	9,703	18,378	4,802	203,454
1946	81,483	10,470	19,478	3,532	114,963
1947	40,606	5,237	13,184	3,339	62,366

Source: Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures for GR-M and Buna N Types include production of privately-owned plants.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1941	1942	1943	1944	1945	1946	1947	1948
Jan.	46,190	49,216	36,085	47,540	52,008	51,746	57,057	61,308
Feb.	42,782	42,666	36,274	47,754	48,856	47,654	50,551	56,487
Mar.	49,572	50,820	41,586	52,263	55,364	56,703	59,947	68,171
Apr.	55,879	49,554	48,177	50,005	59,024	62,111	64,140	72,183
May	60,121	54,212	49,828	54,230	60,748	66,800	70,865	77,186
June	59,062	50,077	53,325	54,266	60,580	63,247	71,329	78,044
July	63,906	54,606	49,867	55,119	66,170	60,076	73,441	81,428
Aug.	63,575	48,793	51,880	55,618	70,058	66,729	72,089	80,351
Sept.	59,768	50,093	49,707	56,318	64,529	62,268	71,384	.....
Oct.	58,412	50,094	53,111	53,154	55,708	66,637	73,277	.....
Nov.	54,670	50,729	50,703	54,967	53,543	61,345	64,158	.....
Dec.	53,568	39,250	48,695	52,250	49,745	61,101	67,285	.....
Total	667,505	589,110	568,238	633,482	696,333	735,417	795,535	.....

Source: U. S. Bureau of Mines.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	Production	Consumption—Tons	Consumption—% to Crude [a]	Exports	Stocks On Hand at End of Period
1936	150,571	141,486	24.6	7,085	19,000
1937	185,033	162,000	29.8	13,233	28,800
1938	122,400	120,800	27.6	7,403	23,000
1939	186,000	170,000	28.7	12,611	25,250
1940	208,971	190,244	29.3	11,347	32,636
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007[b]	254,820	64.6	30,405	42,532
1943	304,058[c]	291,082	59.6	15,678	46,201
1944	260,631[d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1947:					
Mar.	26,209	26,157	26.8	1,268	31,940
Apr.	26,696	25,066	25.5	1,073	33,527
May	25,408	21,908	23.1	1,271	37,145
June	24,144	21,283	25.0	1,200	39,598
July	21,252	20,433	26.8	1,052	39,704
Aug.	21,658	21,093	24.4	1,414	40,130
Sept.	22,561	23,801	25.6	902	38,461
Oct.	25,648	26,735	26.3	1,016	36,643
Nov.	23,145	23,425	25.7	1,339	36,347
Dec.	25,123	25,229	25.4	1,437	35,943
1948:					
Jan.	25,634	25,885	25.5	768	36,307
Feb.	23,678	22,374	25.9	1,273	38,444
Mar.	24,089	24,362	26.0	937	38,313
Apr.	21,802	22,322	26.2	1,049	37,946
May	21,043	21,975	25.2	948	36,612
June	22,504	23,786	25.1	925	35,898
July	17,712	19,291	23.2	712	34,302
Aug.	20,255	22,917	24.7	643	32,025
Sept.	21,790	24,115	26.5	740	30,363

Source: 1936-40, Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. ([a]) Includes natural and synthetic rubber. ([b]) Includes 893 tons of imports. ([c]) Includes 67 tons of imports. ([d]) Includes 21 tons of imports.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1930	2,784,745	571,241	3,355,986	1939	2,866,796	704,308	3,571,104
1931	1,973,090	416,648	2,389,738	1940	3,692,328	721,637	4,413,965
1932	1,135,491	235,187	1,370,678	1941	3,744,500	875,381	4,619,681
1933	1,573,512	346,545	1,920,057	1942	220,814	133,083	353,897
1934	2,177,919	575,192	2,753,111	1943	0	4,501	4,501
1935	3,252,244	694,690	3,946,934	1944	0	124,819	124,819
1936	3,669,528	781,862	4,451,390	1945	83,792	313,643	397,435
1937	3,915,889	892,382	4,808,271	1946	2,148,699	930,760	3,079,459
1938	2,000,985	485,852	2,486,837	1947	3,558,178	1,220,634	4,778,812
1947:							
Jan.	246,605	99,818	346,423	July	279,631	97,814	377,445
Feb.	267,015	105,042	372,057	Aug.	261,158	86,509	347,667
Mar.	301,525	118,234	419,759	Sept.	307,942	110,720	418,662
Apr.	314,765	106,984	421,749	Oct.	315,969	118,365	434,334
May	284,357	96,430	380,787	Nov.	305,148	87,611	392,759
June	307,124	91,810	398,934	Dec.	366,939	101,569	468,508
1948:							
Jan.	305,081	99,200	404,281	July	356,764	116,780	473,544
Feb.	274,847	107,054	381,901	Aug.	348,804	111,782	460,542
Mar.	349,998	140,606	490,604	Sept.	301,251	111,224	412,575
Apr.	308,071	128,963	437,034	Oct.	.....	.....	.....
May	225,461	111,789	337,250	Nov.	.....	.....	.....
June	312,406	117,572	429,978	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.

Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Rim Production

	1943	1944	1945	1946	1947
Passenger Car	780,291	1,748,917	4,504,368	15,058,469	21,346,004
Truck & Bus	4,949,004	6,391,441	6,486,652	5,939,244	7,737,353
Agricultural	301,997	997,301	1,441,909	1,735,992	2,633,699
Earth Mover	945	703	1,308	5,520	10,610
Total	6,032,237	9,138,362	12,434,237	22,739,225	31,727,666

	1948					
	Apr.	May	June	July	Aug.	Sept.
Passenger Car	2,023,747	1,729,087	2,090,787	2,101,695	2,164,158	1,787,181
Truck & Bus	572,605	604,566	580,067	579,616	501,308	505,616
Agricultural	360,806	229,278	235,403	236,705	208,471	327,644
Earth Mover	582	897	1,317	1,066	352	1,635
Total	2,957,740	2,563,828	2,907,574	2,919,082	2,874,289	2,621,576

Source: The Tire & Rim Association, Inc.

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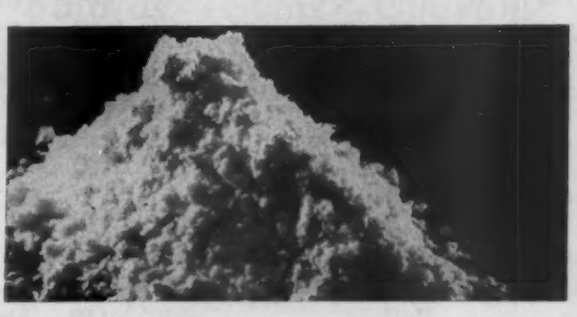

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Early in our pioneering efforts as flock producers, we recognized that the special needs of the Rubber Industry call for a special group of fillers. Here in "Filfloc" is a product developed specifically to enhance strength, as well as impart non-marking qualities. Through experience and joint research with you, we furnish various types of "Filfloc" to meet EXACTLY your needs for compounding crude, synthetic or reclaim.

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COTTON FILLERS FOR PLASTICS

100 MOSHASSUCK ST., PAWTUCKET, RHODE ISLAND

Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1936 (total)	21,446	30,866	1,073	53,385	56,041	10,717
Passenger Car.	18,941	26,999	644	46,584	49,013	9,291
Truck and Bus	2,505	3,867	429	6,801	7,028	1,426
1937 (total)	22,353	29,886	1,246	53,485	53,310	10,383
Passenger Car.	20,055	26,177	696	46,928	46,497	8,745
Truck and Bus	2,298	3,709	550	6,557	6,813	1,638
1938 (total)	11,516	30,567	1,049	43,132	40,907	8,451
Passenger Car.	10,086	27,104	580	37,770	35,789	6,937
Truck and Bus	1,430	3,463	469	5,362	5,118	1,514
1939 (total)	18,208	38,022	1,279	57,509	57,613	8,665
Passenger Car.	15,742	33,471	607	49,820	49,933	7,108
Truck and Bus	2,466	4,551	672	7,689	7,680	1,557
1940 (total)	22,252	35,346	1,176	58,774	59,186	9,127
Passenger Car.	19,560	30,903	411	50,874	50,965	7,270
Truck and Bus	2,692	4,443	765	7,900	8,221	1,857
1941 (total)	24,780	39,895	1,489	66,164	61,540	4,436
Passenger Car.	19,855	34,119	586	54,560	50,392	3,165
Truck and Bus	4,925	5,776	903	11,604	11,148	1,271
1942 (total)	6,680	8,872	207	15,759	15,351	6,247
Passenger Car.	910	2,734	38	3,682	2,790	4,432
Truck and Bus	5,770	6,138	169	12,077	12,561	1,815
1943 (total)	6,128	18,547	225	24,900	20,423	1,883
Passenger Car.	82	10,606	71	10,759	7,620	1,132
Truck and Bus	6,046	7,941	154	14,141	12,803	751
1944 (total)	6,654	26,439	263	33,356	33,446	2,013
Passenger Car.	208	18,330	130	18,668	18,819	1,218
Truck and Bus	6,446	8,109	133	14,688	14,627	795
1945 (total)	5,984	36,479	504	42,967	44,524	3,077
Passenger Car.	1,115	25,463	222	26,800	28,200	2,214
Truck and Bus	4,869	11,016	282	16,167	16,324	863
1946 (total)	15,310	65,490	1,512	82,312	82,298	2,448
Passenger Car.	11,086	54,684	653	66,423	66,466	1,763
Truck and Bus	4,224	10,806	859	15,889	15,832	685
1947 (total)	25,055	62,890	3,249	91,194	95,548	6,975
Passenger Car.	19,644	52,865	1,608	74,117	77,790	5,470
Truck and Bus	5,411	10,025	1,642	17,077	17,758	1,505
1948:						
May (total)	1,818	4,301	136	6,254	6,931	11,611
Passenger Car.	1,373	3,698	39	5,110	5,720	9,449
Truck and Bus	445	603	97	1,145	1,211	2,162
June (total)	2,189	5,474	164	7,827	7,584	11,435
Passenger Car.	1,725	4,713	43	6,481	6,298	9,323
Truck and Bus	464	761	121	1,346	1,286	2,112
July (total)	2,379	5,357	131	7,866	6,672	10,207
Passenger Car.	1,928	4,592	41	6,560	5,516	8,254
Truck and Bus	451	765	90	1,306	1,156	1,953
Aug. (total)	2,290	5,409	136	7,835	6,963	9,335
Passenger Car.	1,884	4,637	55	6,576	5,769	7,463
Truck and Bus	406	772	81	1,259	1,194	1,873

Source: The Rubber Manufacturers Association, Inc.

Cotton, Rayon and Nylon Tire Fabrics

(Production in Thousands of Pounds)

	Cotton				Rayon and Nylon [b]		
	Tire Cord Not Woven	Cord Fabric Woven	Chafer and All Other Tire Fabrics	Total	Tire Cord Not Woven	Tire Cord And Other Tire Fabrics	Total
1945:							
Jan.-Mar.	16,671	43,835	12,306	72,812	3,726	37,777	41,503
Apr.-June	16,044	42,383	13,604	72,031	4,064	42,476	46,540
July-Sept.	15,136	38,158	14,122	67,416	3,549	42,606	46,155
Oct.-Dec.	15,514	36,442	13,573	65,529	a	47,734	47,734
Total	63,365	160,818	53,605	277,788	11,339	170,593	181,932
1946:							
Jan.-Mar.	17,128	39,377	15,245	71,750	a	51,208	51,208
Apr.-June	19,622	40,197	18,623	78,442	a	52,511	52,511
July-Sept.	17,279	39,259	18,787	75,325	5,102	46,932	52,034
Oct.-Dec.	20,660	42,668	21,708	85,036	5,858	50,589	56,447
Total	74,689	161,501	74,363	310,553	10,960	201,240	212,200
1947:							
Jan.-Mar.	21,972	49,377	21,815	93,164	5,322	52,059	57,381
Apr.-June	23,491	53,746	16,480	93,717	5,486	47,360	52,846
July-Sept.	15,571	44,291	14,596	74,458	6,161	51,719	57,880
Oct.-Dec.	18,183	48,532	17,762	84,477	6,550	55,078	61,628
Total	79,217	195,946	70,653	345,816	23,519	206,216	229,735
1948:							
Jan.-Mar.	18,546	50,251	19,391	88,188	a	60,569	60,569
Apr.-June	15,585	45,385	18,213	79,183	a	59,759	59,759
July-Sept.	.....	.....	.....	.....	.....	.....	.....
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: U. S. Bureau of the Census.

Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1936	21,514	32,188	721	54,423	57,036	10,945
1937	22,464	29,554	749	52,767	52,373	10,312
1938	11,515	28,134	644	40,293	37,848	8,166
1939	18,190	31,998	1,002	51,190	50,649	7,036
1940	22,172	29,070	972	52,214	52,237	7,017
1941	24,722	33,749	1,232	59,703	57,433	4,686
1942	n.a.	n.a.	n.a.	13,958	12,568	5,742
1943	6,183	12,373	176	18,732	15,260	2,584
1944	6,461	19,739	190	26,390	26,750	2,823
1945	6,119	33,161	408	39,688	41,102	3,671
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,039	49,107	2,496	76,641	75,509	8,089
1948:						
Jan.	2,327	2,745	81	5,152	6,226	9,116
Feb.	2,019	2,382	104	4,505	4,980	9,657
Mar.	2,363	2,731	94	5,188	5,534	9,930
Apr.	2,264	3,456	88	5,807	5,578	9,737
May	1,814	3,516	89	5,419	5,702	10,069
June	2,218	4,421	107	6,745	6,716	9,939
July	2,365	4,365	78	6,807	5,750	8,760
Aug.	2,292	4,522	103	6,917	6,639	8,533

Source: The Rubber Manufacturers Association, Inc.
n.a.—Not available.

Smoked Sheets—Spot Closing Prices

(New York Market—Cents per pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1910	288	141	206.60	1929	26⅞	15½	20.55
1911	184	114	141.30	1930	16½	7½	11.98
1912	140	108	121.60	1931	8⅝	4¼	6.17
1913	113	59	82.04	1932	4¾	2½	3.49
1914	93	56	65.33	1933	9⅞	2⅜	5.96
1915	79	58½	65.85	1934	15⅞	8¾	12.92
1916	102	55	72.50	1935	13¾	10½	12.37
1917	90	52	72.23	1936	23	13½	16.41
1918	70	40	60.15	1937	26⅞	14	19.39
1919	57	38½	48.70	1938	17⅞	10¾	14.64
1920	56½	16	36.30	1939	24	14⅛	17.57
1921	21¾	11½	16.36	1940	24	18¾	20.10
1922	28⅜	13¾	17.50	1941	24⅞	19¾	22.40
1923	37⅞	24¾	29.45	1942	22½	22½	22.50
1924	40⅜	17⅝	26.20	1943	22½	22½	22.50
1925	121	34⅜	72.46	1944	22½	22½	22.50
1926	88½	36¾	48.50	1945	22½	22½	22.50
1927	41¾	33	37.72	1946	22½	22½	22.50
1928	41¼	17	22.48	1947	25	14	20.00

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1941	1942	1943	1944	1945	1946	1947	1948
Jan.	10.66	19.85	21.34	20.76	22.36	25.49	32.58	36.09
Feb.	10.87	20.05	21.61	21.34	22.29	26.57	33.91	33.63
Mar.	11.08	20.42	21.98	21.65	22.43	27.52	35.89	35.04
Apr.	11.48	21.10	22.02	21.71	21.88	28.40	35.89	38.10
May	12.97	20.88	21.97	21.63	23.30	28.17	36.51	38.57
June	14.66	19.78	21.92	23.31	23.42	29.89	37.83	38.12
July	16.55	20.27	21.46	22.33	23.27	34.11	38.03	34.89
Aug.	17.06	19.45	21.09	22.11	23.10	36.31	34.83	32.23
Sept.	17.94	19.62	21.10	22.10	23.25	37.59	32.21	31.92
Oct.	17.31	19.79	21.00	22.32	23.85	36.79	32.39	32.01
Nov.	17.21	20.21	20.32	22.13	24.71	31.50	34.50	....
Dec.	18.09	20.55	20.32	22.28	25.21	33.03	36.74	....
Average for Year	14.66	20.16	21.34	21.89	23.25	31.28	35.11	....

Consumption of Vinyl Resins

(In Thousands of Pounds)

	Sheeting and Film [a]	Textile and Paper Coating Resins [b]	Molding and Extrusion Materials [b]	All Other [b, c]
1946	52,080	11,673	61,852	27,083
1947	66,430	17,237	73,114	27,064
1947:				
Nov.	7,246	1,680	5,760	2,155
Dec.	8,094	2,183	7,829	2,298
1948:				
Jan.	7,785	2,414	7,823	1,531
Feb.	5,980	2,102	7,601	1,951
Mar.	7,537	3,053	6,767	1,680
Apr.	7,468	2,938	6,725	2,066
May	6,351	2,318	5,680	1,597
June	7,194	2,089	4,312	1,594

Source: Bureau of the Census.

Notes: (a) Includes weight of fillers, plasticizers, extenders and safety glass sheeting; (b) Resin content; (c) Includes Adhesives, but excludes data for protective coating resins.

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—Orvus permits articles to leave molds readily; molds clean easily.
—Orvus is effective in hardest water.
—Orvus forms no insoluble materials which might be deposited as a film on mold or rubber.

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—Orvus cleans thoroughly such articles as inner tubes, automotive parts and other molded and extruded rubber goods. Leaves articles with a pleasing finish.

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FIRST NATIONAL TOWER
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HEmlock 2188

Unlike regular soluble sulphurs, CRYSTEX has the special property of not blooming on uncured stocks. CRYSTEX Insoluble Sulphur replaces ordinary rubbermakers sulphur in tire carcass stocks, white side-walls, valve-patch frictions, re-treads and other repair stocks, and in many plied-up mechanical stocks.

Due to improved and expanded manufacturing facilities, CRYSTEX now costs less and is more practical than ever in rubber-making processes.

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Rubber Industry Employment, Payrolls, Wages and Hours

Employment — Thousands of Production Workers and Index (1939 = 100)

	1947				1948			
	All Rubber Products		Rubber Tires & Tubes		All Rubber Products		Rubber Tires & Tubes	
Month	Number	Index	Number	Index	Number	Index	Number	Index
Jan.	240	198.8	110	235.5	210	173.5	106	185.5
Feb.	240	198.2	109	233.3	208	172.0	99	182.4
Mar.	238	196.5	108	231.4	204	168.9	96	177.7
Apr.	234	193.5	106	227.0	198	163.8	93	170.7
May	223	184.5	102	220.0	195	161.1	91	168.5
June	207	170.9	118	217.0	195	161.6	92	169.4
July	200	165.1	115	212.3	190	157.5	91	167.6
Aug.	203	167.9	105	193.0	194	160.7	...	....
Sept.	203	168.1	101	185.2	...	....	...	....
Oct.	208	171.7	102	188.0	...	....	...	....
Nov.	210	174.0	102	188.7	...	....	...	....
Dec.	212	175.3	102	187.8	...	....	...	....

Note: Figures from June, 1947, to date have been revised to adjust them to levels indicated by Federal Security Agency data for 1946; revisions for January-May, 1947, will be shown later.

Payrolls — Production Workers Pay Rolls Unadjusted Index (1939 = 100)

	1946		1947		1948	
Month	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes
Jan.	290.1	272.6	386.3	416.3	354.9	344.4
Feb.	292.1	271.9	385.0	413.3	337.2	315.4
Mar.	298.2	281.1	374.3	397.3	320.6	292.4
Apr.	319.7	312.9	383.9	414.2	312.8	286.4
May	322.1	314.2	367.2	399.3	318.9	305.7
June	331.4	318.3	342.3	396.1	330.2	322.0
July	321.4	304.3	331.2	389.5	329.1	329.8
Aug.	336.9	311.2	337.6	355.5	....	....
Sept.	363.9	348.9	348.3	355.3	....	....
Oct.	361.3	346.1	354.4	354.7	....	....
Nov.	377.4	360.3	361.4	362.4	....	....
Dec.	392.2	368.9	373.6	365.6	....	....

Note: Figures from June, 1947, to date have been revised to adjust them to levels indicated by Federal Security Agency data for 1946; revisions for January, 1946, through May, 1947, will be shown later.

Wages — Average Weekly Earnings

	1946		1947		1948	
Month	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes
Jan.	$46.71	$50.29	$54.03	$59.78	$57.33	$62.72
Feb.	46.05	49.21	54.06	59.90	54.70	58.22
Mar.	46.46	49.72	52.97	58.05	53.24	55.54
Apr.	49.67	54.77	55.23	61.64	53.39	56.54
May	49.82	54.72	55.30	61.12	55.45	61.15
June	50.45	54.82	55.49	61.35	57.14	63.96
July	50.60	56.11	55.74	62.06	58.31	66.30
Aug.	51.03	55.42	55.92	61.15	....	....
Sept.	53.69	59.89	57.76	64.75	....	....
Oct.	51.74	57.38	57.62	63.78	....	....
Nov.	52.93	58.87	57.99	64.86	....	....
Dec.	54.63	60.46	59.47	65.74	....	....

Wages — Average Hourly Earnings

	1946		1947		1948	
Month	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes
Jan.	$1.121	$1.255	$1.330	$1.511	$1.444	$1.646
Feb.	1.129	1.266	1.331	1.517	1.421	1.613
Mar.	1.138	1.275	1.330	1.512	1.408	1.599
Apr.	1.232	1.414	1.397	1.608	1.412	1.603
May	1.266	1.446	1.416	1.622	1.424	1.636
June	1.283	1.461	1.419	1.615	1.439	1.651
July	1.292	1.472	1.445	1.640	1.470	1.684
Aug.	1.295	1.474	1.445	1.640	....	....
Sept.	1.323	1.507	1.447	1.661	....	....
Oct.	1.313	1.492	1.436	1.644	....	....
Nov.	1.322	1.503	1.453	1.661	....	....
Dec.	1.331	1.513	1.454	1.658	....	....

Hours — Average Weekly Hours per Worker

Month	1946	1947	1948	Month	1946	1947	1948
January	41.7	40.6	39.7	July	39.2	38.6	39.7
February	40.8	40.6	38.5	August	39.4	38.7	...
March	40.8	39.8	37.8	September	40.6	39.9	...
April	40.3	39.5	37.8	October	39.4	40.1	...
May	39.4	39.0	39.0	November	40.1	39.9	...
June	39.3	39.1	39.7	December	41.2	40.9	...

Source: U. S. Department of Commerce. Note: These figures are revised from time to time and the latest available issue should be consulted for the most accurate data.

Indexes of Production, Shipments and Inventory For The Rubber Industry

Production 1935-1939 = 100 (Based on man-hours)

Month	1946	1947	1948	Month	1946	1947	1948
Jan.	215	247	223	July	211	207	200
Feb.	216	246	215	Aug.	221	210	204
Mar.	221	239	205	Sept.	234	217	....
Apr.	219	234	200	Oct.	234	223	....
May	215	220	201	Nov.	243	225	....
June	218	216	205	Dec.	252	230	....

Shipments—Average Month 1939 = 100 (Based on $ Value)

Jan.	211	301	282	July	278	298	339
Feb.	214	326	289	Aug.	292	312	354
Mar.	223	332	285	Sept.	321	346	....
Apr.	291	320	312	Oct.	344	348	....
May	297	309	317	Nov.	324	354	....
June	302	322	342	Dec.	363	307	....

Inventory — Average Month 1939 = 100 (Based on $ Value)

Jan.	171	229	271	July	187	268	289
Feb.	177	241	283	Aug.	191	258	287
Mar.	183	253	294	Sept.	197	246	....
Apr.	190	270	293	Oct.	204	247	....
May	188	279	296	Nov.	207	242	....
June	185	277	295	Dec.	209	257	....

Source: U. S. Department of Commerce.

Various Compounding Materials Consumed by the Rubber Industry

Material	1941	1942	1943	1944	1945	1946	1947
Asphalt [a]							
Short tons	20,536	22,263	16,510	20,189	19,483	28,715	32,113
% of total	0.6	0.6	0.5	0.6	0.5	0.7	0.7
Barite (Barytes):							
Short tons	9,800	6,334	8,000	10,000	10,000	20,000	17,000
% of total	4.2	3.6	3.9	2.9	2.1	4.4	3.1
Carbon Black:							
Short tons	219,751	147,974	236,737	369,015	402,193	470,732	.....
% of total	68.2	65.8	75.2	78.7	78.9	74.1	..
Clay, Kaolin:							
Short tons	127,0555	51,334	50,964	59,588	109.936	162,393	166,201
% of total	11.6	5.1	5.5	6.8	11.7	12.3	12.0
Clay, Fire & Stoneware:							
Short tons	9,000	5,000	10,259	7,160	7,800	12,951	.....
% of total	0.2	0.1	0.2	0.1	0.1	0.2	..
Lead Sulfate, Basic:							
Short tons	200	89	131	268	200	.....	.....
% of total	1.9	1.1	2.3	4.2	5.2	..	..
Lime:							
Short tons	3,058	1,381	2,039	5.634	7,170	3,193	.....
% of total	0.05	0.02	0.05	0.13	0.10	0.1	..
Litharge:							
Short tons	3,968	3,460	4,302	3,023	1,864	2,131	.....
% of total	3.3	3.8	3.8	2.2	1.3	1.6	..
Lithopone:							
Short tons	3,547	1,047	1,078	726	977	1,607	3,085
% of total	2.0	0.8	0.8	0.5	0.7	1.1	1.1
Mica, Ground:							
Short tons	3,476	1,754	3,063	1,137	3,715	4,951	.....
% of total	8.0	3.7	6.0	2.2	7.0	8.0	..
Sulfur:							
Short tons	63,900	40,000	51,000	63,000	64,960	72,800	.....
% of tgotal	2.4	1.4	1.8	1.9	2.0	2.2	..
Talc [b]							
Short tons	58,114	40,487	48,994	51,833	63,758*	65,980	.....
% of tgotal	13.9	10.0	11.8	13.0	16.0	14.4	..
Zinc Oxide:							
Short tons	90,429	52,717	67,898	59,518	63,447	83,776	.....
% of total	63.4	53.0	47.4	42.3	49.6	53.1	..

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes pyrophyllite and ground soapstone. * Revised.

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946, of THE RUBBER AGE, published monthly at East Stroudsburg, Pa., for October, 1948.

State of New York }
County of New York } ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared Peter P. Pinto, who, having been duly sworn according to law, deposes and says that he is the Business Manager of The Rubber Age and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Section 537, Postal Laws and Regulations), to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Palmerton Publishing Company, Inc., 250 W. 57th St., New York 19, N. Y.; Editor, M. E. Lerner, 250 W. 57th St., New York 19, N. Y.; Managing Editor, None; Business Manager, Peter P. Pinto, 250 W. 57th St., New York 19, N. Y.

2. That the owner is (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given):

Palmerton Publishing Company, Inc., 250 W. 57th St., New York 19, N. Y.; P. L. Palmerton, 250 W. 57th St., New York 19, N. Y.; Earl D. Osborn, 40 E. 36th St., New York 16, N. Y.; Peter P. Pinto, 250 W. 57th St., New York 19, N. Y.; M. E. Lerner, 250 W. 57th St., New York 19, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholders or security holders appear upon the books of the company as trustees or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has not reason to believe that any other person, association, or corporation has any interest, direct or indirect, in the said stocks, bonds, or other securities than as so stated by him.

PETER P. PINTO, Business Manager.

Sworn to and subscribed before me this 22nd day of September, 1948.
(SEAL) HERMAN CASAROFF, Notary Public.
(My commission expires March 30th, 1949.)

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Photograph courtesy Cat's Paw Rubber Co.

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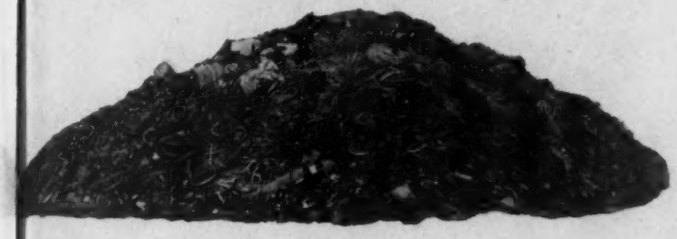

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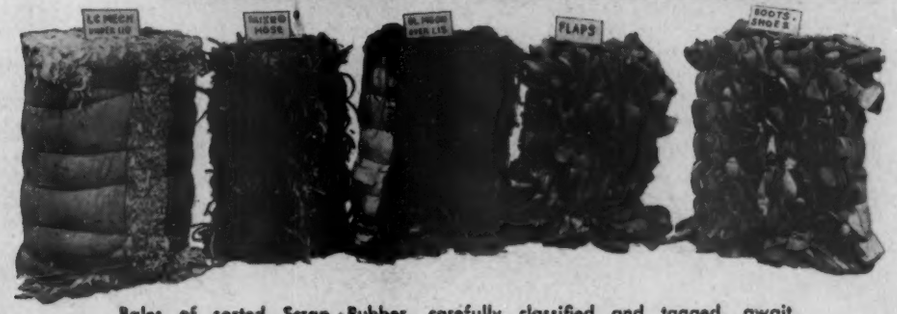

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